SUPPLEMENTAL MATERIAL

Gaseous Air Pollutant Measurements

Standard federal reference methods were used to measure criteria gas pollutants (US EPA 2004). Continuous (1-min) NO and NO_2 measurements were obtained at a location in the immediate environment outside each retirement community and collocated with particle samplers. We deployed two parallel samplers for quality assurance and to assure a complete set of data. We used Thermo Environmental NO_x Analyzers (Model 42, Thermo Environmental instruments Inc, Franklin, MA). Dasibi Carbon Monoxide Analyzers (Model 3008, Dasibi Environmental Corp, Glendale, CA) were deployed to measure continuous (1-min) CO levels. Continuous (1-min) outdoor ozone (O_3) concentrations were also monitored at each community by using API Ozone Analyzers (Model 400A, Teledyne Technologies Inc, Los Angeles, CA).

Regression models for biomarkers showed associations for NO_x were stronger and with tighter confidence intervals than NO_2; therefore, results below are presented only for NO_x.

References

United States Environmental Protection Agency (US EPA). 2004. Air Quality Criteria for Particulate Matter. Office of Research and Development, Washington, DC.

Particle mass measurement methods

Integrated (24-h) size segregated outdoor particulate matter (PM) samples were collected at all sites by means of Sioutas™ Personal Cascade Impactors (SKC Inc, Eighty Four, PA) (Misra et al. 2002; Singh et al. 2003) from Monday to Friday. This device, described and validated elsewhere (Majestic et al. 2006; 2008; Misra et al. 2002; Singh et al. 2003), employs 2 impaction stages and an after-filter. Coarse mode PM (PM > 2.5 μm), accumulation mode PM (PM 0.25-2.5 μm), and quasi-ultrafine mode PM (PM<0.25 μm) were sampled on Zefluor filters (3 μm pore-size, Pall Life Sciences, Ann Arbor MI). Misra et al. (2002) describe the performance of the PCIS in greater detail. Briefly, the PCIS sampler was operated at a flow rate of 9 L/min using a diaphragm pump (DOA-P701-AA, Brenner-Fiedler & Associates, Cerritos CA). The entire impactor sampler is enclosed in a cassette holder, 4 cm in diameter and 6 cm high, made of soft aluminum in order to avoid particle losses due to electrostatic deposition.

Outdoor particle mass concentrations of quasi-ultrafine, accumulation and coarse fractions were determined by weighing the Zefluor substrates collected with the Sioutas Impactor. Gravimetric weights were taken before and after each sample collection using a Mettler 5 Microbalance (Mettler-Toledo, Columbus, OH; weight uncertainty ± 2 μg) under controlled conditions (RH, 40-45% and temperature 22-24 °C) in the facilities of the Aerosol Laboratory at the University of Southern California. Filters were weighed after a 24-hour equilibration period. Laboratory and field blanks were used for quality assurance.

References

Majestic BJ, Schauer JJ, Shafer MM, et al. 2008. Trace metal analysis of atmospheric particulate matter: A comparison of personal and ambient samplers. J Environ Engineering Science; 7:289-298.

Majestic BJ, Schauer JJ, Shafer MM, et al. 2006. Development of a wet-chemical method for the speciation of iron in atmospheric aerosols. Environ Science Technol 40:2346-2351.

Misra C, Singh M, Shen S, et al. 2002. Development and evaluation of a personal cascade impactor sampler (PCIS). J Aerosol Science 2002; 33:1027-104.
Singh M, Misra C, Sioutas C. 2003. Field evaluation of a personal cascade impactor sampler (PCIS.) Atmos Environ; 37: 4781-4793.

EC tracer method

The contributions of secondary OC (SOC) and primary OC (OC_{pri}) to measured outdoor OC were estimated from collected OC and EC concentrations using EC as a tracer of primary combustion generated OC (i.e., "EC tracer method") (Cabada et al. 2004; Lim et al. 2003; Polidori et al. 2006; Turpin et al. 1995). This method assumes that OC_{pri} and EC are emitted from the same combustion sources. Data points characterized by high CO and NO peaks, mainly observed during morning rush hour traffic, were used to identify periods dominated by primary sources, when SOC is less likely to be formed. By regressing the OC and EC data collected during these periods, the characteristic primary OC/EC ratio for each month of study was determined. Because a conventional linear least-squares regression assumes that there are uncertainties only in the dependent variable, a Deming linear least-squares regression (Cornbleet and Gochman 1979; Deming 1943) was used instead, and the uncertainties in OC and EC were assumed equal. Thus, OC_{pri} and SOC can be estimated by the following expressions:

$$OC_{pri} = a \times EC + b \qquad (1)$$

$$SOC = OC - OC_{pri}, \qquad (2)$$

where $a = (OC/EC)_{pri}$, which is the characteristic primary OC/EC ratio for the study area, and b = non-combustion primary OC. Typically, the SOC values estimated through this method vary with season and location and are generally higher during the afternoon hours of summertime photochemical smog episodes (e.g., in the Los Angeles basin) and at locations that are recipients of long-distance transport (e.g., the Eastern United States).

References

Cabada J.C; Pandis S.N.; Subramanian R.; Robinson A.L.; Polidori A.; Turpin B. 2004. Estimating the Secondary Organic Aerosol Contribution to PM2.5 Using the EC Tracer Method. Aerosol Sci. Technol 38:140-155.
Cornbleet, P.J.; Gochman, N. 1979. Incorrect Least-Squares Regression Coefficients in Method-Comparison Analysis; Clin. Chem 25:432-438.
Deming, W.E. Statistical Adjustment of Data; Wiley: New York, NY, 1943.
Lim, H.J.; Turpin, B.J.; Russell, L.M.; Bates, T.S. 2003.Organic and Elemental Carbon Measurements during ACE-Asia Suggest a Longer Atmospheric Lifetime for Elemental Carbon; Environ. Sci. Technol 37:3055-3061.
Polidori, A.; Turpin, B.J.; Lim, H.-J.; Cabada, J.C.; Subramanian, R.;Pandis, S.N.; Robinson, A.L. 2006. Local and Regional Secondary Organic Aerosol: Insight from a Year of Semi-Continuous Carbon Measurements at Pittsburgh; Aerosol Sci. Technol 40:861-872.
Turpin, B.J.; Huntzicker, J.J. 1995. Identification of Secondary Organic Aerosol Episodes and Quantitation of Primary and Secondary Organic Aerosol Concentrations during SCAQS; Atmos. Environ 29:3527-3544.

Regression Model, Mean Centering Method

Group outdoor home exposures are assigned to each subject in each of their two phases of study. Thus, there are three different exposure-outcome relationships that will affect the interpretation of pollutant associations with a subject's biomarkers: the between-group effect; the within-group, between-phase effect; and the within-subject, within-phase effect. The between-group effect of exposure is the overall biomarker concentrations associated with differences in the air pollutants across groups. This is potentially confounded by time-independent group characteristics, such as the cultural practices, diet, or health-related activities in the retirement community that could affect biomarkers. The within-group, between-phase effect of exposures effect is the overall biomarker concentrations associated with differences in the air pollutants across phases for the same group. Because the phases are at different periods, this exposure effect may be confounded by other unmeasured seasonal factors. The within-phase, within-subject effect of exposure is the parameter of interest. This is the association of overall biomarker concentrations with differences in the air pollutants across weekly measurements in the same phase for the same subject. The following mixed model was tested as proposed by Janes et al. (2008):

Let the index *i* indicate the retirement community group (*i* = 1,2,3,4), *j* indicate season (phase) within year 1 and 2 (*j* = 1,2,3,4) nested within community, *k* indicate subject (*k* = 1,…,60) within community, and *t* indicate the weekly biomarker measurement (*t* = 1,…,12). Then a given biomarker measurement, $Y_{i,j,k,t}$ will be related to the following three different exposure-outcome relationships:

$\overline{X}_{ik}$ is the between-group (*bg*) component, which is the average exposure for group *i* assigned to each subject *k*, and

$\overline{X}_{ijk} - \overline{X}_{ik}$ is the within-group, between-phase (*wgbp*) component for subject *k* in group *i*, or the average exposure in phase *j* minus the overall average exposure.

We're still most interested in associations for within-phase exposures assigned to each subject in the group as follows:

$X_{ijkt} - \overline{X}_{ijk}$ is the within-subject, within-phase (*wswp*) component, which is the assigned exposure at biomarker measurement time *t* for subject *k* minus the average exposure for the phase.

The mixed model is then:

$$Y_{i,j,k,t} = a_{i,j,t} + \alpha Z_{i,j,t} + \beta_{bg}\overline{X}_{ik} + \beta_{wgbp}\left(\overline{X}_{ijk} - \overline{X}_{ik}\right) + \beta_{wswp}\left(X_{ijkt} - \overline{X}_{ijk}\right) + \varepsilon_{i,j,k,t}$$

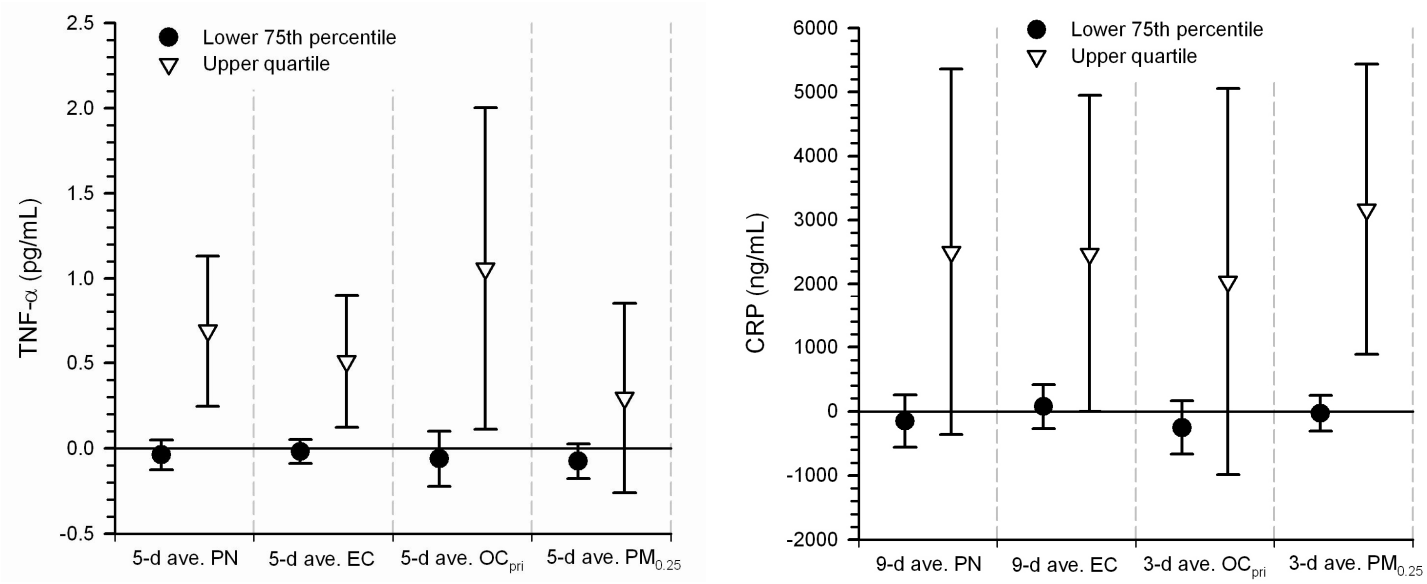
Where $a_{i,j,k}$ is the random subject intercept nested in group and phase, $Z_{i,j,k}$ is a vector of subject characteristics specifying such covariates as medication use, and $\varepsilon_{i,j,k,t}$ denotes random within-person error in the biomarker measurement.

References

Janes H, Sheppard L, Shepherd K. Statistical analysis of air pollution panel studies: an illustration. Ann Epidemiol 2008;18:792-802.

Supplemental Material, Figure 1. Associations of TNF-α and CRP with outdoor air pollution: differences between subjects with mean biomarkers in the lower 75th percentile vs. upper quartile.

(A) TNF-α (pg/mL). (B) CRP (ng/mL). Expected change in the biomarker (adjusted coefficient and 95% CI) corresponds to an interquartile range change in the air pollutant (Table 3 of manuscript).

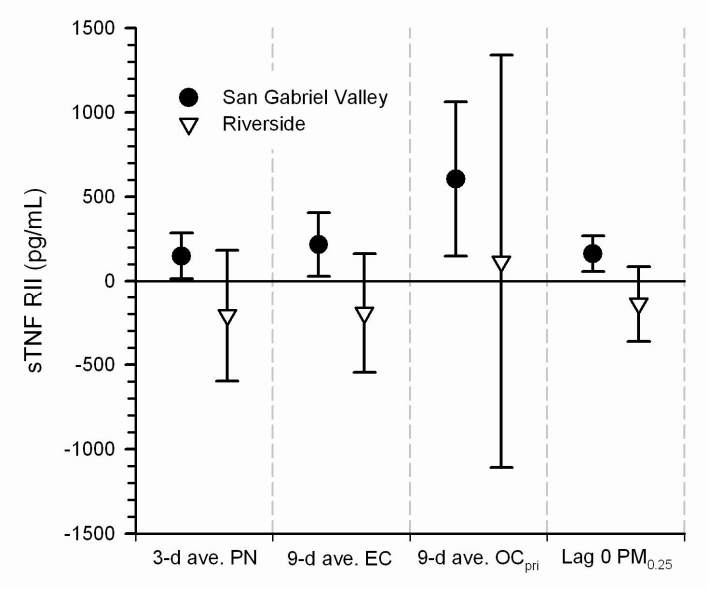


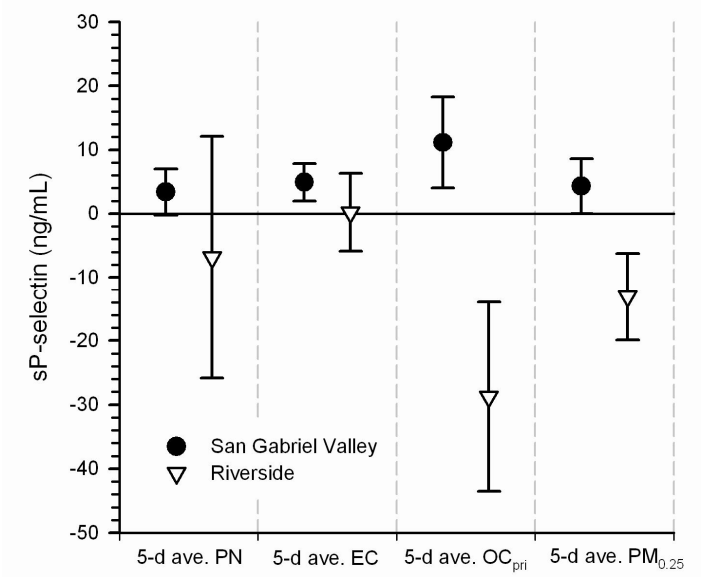
We found that similar to its receptor, models for TNF-α revealed positive associations with markers of traffic-related air pollution, but only for subjects with mean TNF-α in the upper quartile of its distribution (Figure 1). Similarly, among subjects with mean CRP in the upper quartile of its distribution we found positive associations of CRP with $PM_{0.25}$ and markers of traffic-related air pollution (Figure 1). Consistent with findings of a protective effect of statins for TNR-RII (see manuscript), there were fewer subjects taking statins in the upper quartile of CRP (33%) than in the lower 75th percentile strata (73%, OR 0.18, 95% CI: 0.05, 0.64), but there was little difference in statin use between TNF-α strata.

The pro-inflammatory effects of air pollutants may increase cardiovascular risk among those people susceptible due to chronic inflammatory states. This is supported by the present finding of associations of air pollutants with CRP and TNF-α only among subjects in the upper quartile of biomarker means. Previous panel studies reported similar findings (Dubowsky et al. 2006, Ruckerl et al. 2006).

Supplemental Material, Figure 2. Associations of biomarkers with outdoor air pollutants: differences by study region.

(A) TNF-RII (pg/mL). (B) sP-selectin (ng/mL). Expected change in the biomarker (adjusted coefficient and 95% CI) corresponds to an interquartile range change in the air pollutant (Table 3 of manuscript). There were 44 subjects in the three San Gabriel Valley communities and 16 in the Riverside community.





Models were more strongly positive in the San Gabriel Valley (44 subjects) than in Riverside (16 subjects) for sTNF-RII and sP-selectin (Figure 2). There was an unexpected inverse association of sP-selectin with OC_{pri} and with $PM_{0.25}$ in the Riverside community (reflected in model results including all subjects, Supplemental Material, Table 3), whereas there were positive associations in San Gabriel Valley communities.

Supplemental Material, Table 1. Associations of erythrocyte glutathione peroxidase-1 and Cu,Zn superoxide dismutase with outdoor air pollutants among subjects with positive responses.[a]

Air Pollutant	Ave. time	Cu,Zn SOD (U/g Hb) Coeff. (95% CI)[b]	GPx-1 (U/g Hb) Coeff. (95% CI)
Particle number	1-day	656 (-885, 2198)	-1.68 (-5.78, 2.42)
	3-day	2086 (468, 3704)	3.60 (-0.50, 7.69)
	5-day	2920 (1206, 4633)	5.80 (1.27, 10.34)
	7-day	2431 (437, 4425)	4.38 (-1.14, 9.91)
	9-day	2966 (637, 5295)	5.66 (-0.85, 12.17)
Elemental carbon	1-day	1249 (126, 2372)	1.55 (-1.15, 4.25)
	3-day	1786 (707, 2864)	1.73 (-0.90, 4.37)
	5-day	1645(338, 2952)	2.86 (-0.16, 5.89)
	7-day	2517 (543, 4490)	4.56 (-0.10, 9.21)
	9-day	3095 (1281, 4910)	8.41 (3.22, 13.59)
Black carbon	1-day	909 (-221, 2038)	0.59 (-2.04, 3.21)
	3-day	1227 (1.59, 2452)	0.20 (-2.78, 3.19)
	5-day	1690 (-139, 3518)	3.65 (-0.96, 8.26)
	7-day	1158 (-1026, 3341)	6.00 (0.58, 11.43)
	9-day	1961 (-224, 4147)	7.23 (2.30, 12.16)
Organic Carbon	1-day	2365 (-1018, 5748)	0.24 (-8.18, 8.67)
	3-day	2650 (-1220, 6519)	-1.00 (-10.86, 8.87)
	5-day	1466 (-2656, 5587)	4.05 (-6.39, 14.48)
	7-day	483 (-5075, 6041)	-1.97 (-19.79, 15.84)
	9-day	2178 (-3713, 8068)	-0.12 (-15.71, 15.47)
Primary OC	1-day	2052 (-846, 4951)	2.66 (-3.87, 9.19)
	3-day	2978 (-151, 6107)	2.87 (-4.11, 9.85)
	5-day	2394 (-1230, 6017)	5.78 (-2.55, 14.11)
	7-day	3211 (-1609, 8032)	7.56 (-5.82, 20.93)
	9-day	5275 (279, 10271)	17.49 (1.77, 33.21)
Secondary OC	1-day	299 (-1051, 1648)	-0.02 (-3.75, 3.71)
	3-day	-23 (-1797, 1752)	-1.80 (-6.38, 2.78)
	5-day	-316 (-2246, 1616)	-0.01 (-4.45, 4.44)
	7-day	-1285 (-3658, 1089)	-3.65 (-10.59, 3.29)
	9-day	-2086 (-5353, 1181)	1.80 (-4.74, 8.34)
CO	1-day	1441 (97, 2786)	-0.97 (-4.45, 2.50)
	3-day	2634 (1416, 3854)	-2.21 (-6.48, 2.06)
	5-day	4227 (2078, 6376)	4.71 (-2.90, 12.33)
	7-day	3474 (914, 6034)	4.20 (-3.29, 11.68)
	9-day	2954 (737, 5172)	4.76 (-1.58, 11.10)
NO_x	1-day	955 (-925, 2835)	-2.98 (-7.85, 1.89)
	3-day	2777 (1398, 4157)	-2.60 (-7.13, 1.93)
	5-day	2711 (950, 4472)	2.68 (-3.18, 8.54)
	7-day	3437 (780, 6094)	4.71 (-3.43, 12.86)
	9-day	3727 (1306, 6148)	9.92 (1.46, 18.39)

Table 1 (cont.)

Air Pollutant	Ave. time	Cu,Zn SOD (U/g Hb) Coeff. (95% CI)[b]	GPx-1 (U/g Hb) Coeff. (95% CI)
$PM_{0.25}$	1-day	2351 (330, 4372)	4.06 (-1.42, 9.54)
	3-day	4904 (2309, 7499)	7.21 (1.40, 13.02)
	5-day	2995 (938, 5051)	6.89 (1.29, 12.50)
$PM_{0.25-2.5}$	1-day	97 (-301, 495)	0.33 (-0.72, 1.37)
	3-day	44 (-916, 1004)	0.50 (-1.97, 2.97)
	5-day	-431 (-1418, 557)	1.34 (-1.18, 3.87)
$PM_{2.5-10}$	1-day	1714 (52, 3376)	1.08 (-1.14, 3.31)
	3-day	1807 (-97, 3711)	4.10 (-0.61, 8.81)
	5-day	364 (-965, 1692)	3.29 (0.54, 6.04)

[a] The models presented include data from five subjects for Cu,Zn SOD and from three subjects for GPx-1. One subject was a positive responder for both biomarkers.

[b] Regression coefficients and 95% confidence intervals are for the expected change in the biomarker associated with an interquartile range change in the air pollutant (see Table 3 of manuscript).

Supplemental Material, Table 2. Associations of erythrocyte glutathione peroxidase-1 (GPx-1) and Cu,Zn-superoxide dismutase (Cu,Zn-SOD) with outdoor air pollutants among the subject group with negative responses. [a]

Air Pollutant	Ave. time	Cu,Zn-SOD (U/g Hb) Coeff. (95% CI)	GPx-1 (U/g Hb) Coeff. (95% CI)[b]
Particle number	1-day	-106 (-261, 48)	-0.59 (-1.39, 0.20)
	3-day	-221 (-393, -49)	-0.86 (-1.77, 0.05)
	5-day	-204 (-398, -9)	-0.72 (-1.73, 0.29)
	7-day	-420 (-672, -168)	-1.96 (-3.35, -0.57)
	9-day	-427 (-714, -140)	-1.37 (-2.84, 0.11)
Elemental carbon	1-day	-215 (-342, -87)	-0.87 (-1.53, -0.21)
	3-day	-226 (-359, -93)	-0.87 (-1.52, -0.22)
	5-day	-209 (-381, -37)	-1.07 (-1.93, -0.21)
	7-day	-122 (-334, 90)	-0.88 (-1.96, 0.20)
	9-day	-74 (-331, 183)	-0.56 (-1.81, 0.69)
Black carbon	1-day	-175 (-273, -78)	-0.56 (-1.07, -0.05)
	3-day	-201 (-323, -79)	-0.71 (-1.34, -0.07)
	5-day	-196 (-364, -28)	-0.91 (-1.80, -0.03)
	7-day	-174 (-383, 35)	-0.81 (-1.90, 0.28)
	9-day	-109 (-342, 124)	-0.52 (-1.72, 0.69)
Organic Carbon	1-day	-242 (-531, 48)	-1.20 (-2.60, 0.21)
	3-day	-268 (-619, 82)	-1.37 (-2.99, 0.25)
	5-day	-111 (-462, 241)	-0.81 (-2.48, 0.87)
	7-day	47 (-389, 482)	-1.15 (-3.17, 0.87)
	9-day	112 (-344, 568)	-1.29 (-3.38, 0.79)
Primary OC	1-day	-422 (-717, -126)	-1.45 (-2.88, -0.02)
	3-day	-491 (-816, -166)	-1.61 (-3.10, -0.11)
	5-day	-366 (-781, 50)	-1.90 (-3.88, 0.09)
	7-day	-142 (-605, 321)	-1.30 (-3.47, 0.86)
	9-day	35 (-519, 588)	-1.18 (-3.70, 1.34)
Secondary OC	1-day	1 (-120, 123)	-0.37 (-0.96, 0.23)
	3-day	40 (-97, 177)	-0.26 (-0.90, 0.38)
	5-day	30 (-114, 174)	-0.17 (-0.87, 0.53)
	7-day	81 (-115, 277)	-0.47 (-1.40, 0.45)
	9-day	72 (-165, 309)	-0.83 (-1.92, 0.26)
CO	1-day	-195 (-338, -52)	-0.82 (-1.55, -0.08)
	3-day	-242 (-399, -85)	-0.85 (-1.66, -0.04)
	5-day	-242 (-440, -44)	-0.84 (-1.88, 0.21)
	7-day	-315 (-664, 34)	-1.04 (-2.85, 0.78)
	9-day	-176 (-508, 156)	-0.47 (-2.19, 1.26)
NO_x	1-day	-173 (-288, -57)	-0.27 (-0.87, 0.33)
	3-day	-235 (-369, -102)	-0.28 (-0.97, 0.42)
	5-day	-285 (-472, -97)	-0.37 (-1.34, 0.60)
	7-day	-340 (-572, -107)	-0.26 (-1.46, 0.95)
	9-day	-249 (-504, 6)	0.00 (-1.29, 1.29)

Table 2 (cont.)

Air Pollutant	Ave. time	Cu,Zn-SOD (U/g Hb) Coeff. (95% CI)	GPx-1 (U/g Hb) Coeff. (95% CI)[b]
$PM_{0.25}$	1-day	-234 (-384, -83)	-1.04 (-1.84, -0.24)
	3-day	-260 (-457, -62)	-1.23 (-2.26, -0.21)
	5-day	-198 (-437, 41)	-0.59 (-1.81, 0.64)
$PM_{0.25-2.5}$	1-day	-88 (-157, -18)	-0.30 (-0.65, 0.05)
	3-day	-100 (-244, 44)	-0.56 (-1.29, 0.16)
	5-day	5 (-117, 128)	-0.20 (-0.83, 0.43)
$PM_{2.5-10}$	1-day	-83 (-176, 10)	-0.58 (-1.08, -0.07)
	3-day	-78 (-234, 77)	-1.15 (-1.98, -0.33)
	5-day	-78 (-188, 33)	-0.68 (-1.26, -0.10)

[a] Models are restricted to 57 subjects negative responses for GPx-1 and 55 subjects with negative responses for Cu,Zn-SOD.

[b] Regression coefficients and 95% confidence intervals are for the expected change in the biomarker associated with an interquartile range change in the air pollutant (see Table 3 of manuscript).

Supplemental Material, Table 3. Associations of circulating biomarkers with outdoor air pollutants: results for all 60 subjects, Coeff. (95% CI).[a]

Air Pollutant	Ave. time	IL-6 (pg/mL)	P-selectin (ng/mL)	TNF-RII (pg/mL)	TNF-α (pg/mL)	CRP (ng/mL)	SOD (U/g Hb)	GPx-1 (U/g Hb)
Particle number	1-day	0.35 (0.16, 0.53)	1.91 (-0.81, 4.62)	114 (-3, 231)	0.10 (-0.01, 0.20)	463 (44, 884)	-52 (-236, 132)	-0.55 (-1.33, 0.23)
	3-day	0.25 (0.03, 0.47)	2.97 (-0.13, 6.07)	109 (-19, 238)	0.14 (0.01, 0.27)	159 (-339, 657)	-83 (-290, 124)	-0.70 (-1.59, 0.20)
	5-day	0.22 (-0.04, 0.47)	3.03 (-0.48, 6.53)	126 (-22, 276)	0.14 (-0.01, 0.29)	172 (-402, 747)	-11 (-248, 227)	-0.48 (-1.47, 0.52)
	7-day	0.34 (-0.03, 0.70)	5.83 (0.98, 10.68)	130 (-81, 343)	0.14 (-0.07, 0.36)	553 (-222, 1328)	-156 (-476, 165)	-1.44 (-2.80, -0.08)
	9-day	0.40 (-0.01, 0.82)	8.72 (3.28, 14.16)	175 (-70, 421)	0.15 (-0.09, 0.38)	757 (-97, 1611)	-130 (-499, 240)	-0.86 (-2.32, 0.60)
Elemental carbon	1-day	0.16 (0.01, 0.31)	2.05 (-0.15, 4.26)	-15 (-86, 55.6)	0.07 ((-0.03, 0.16)	-112 (-444, 219)	-106 (-257, 46)	-0.70 (-1.34, -0.07)
	3-day	0.26 (0.08, 0.44)	2.40 (0.22, 4.59)	66 (-22, 154)	0.11 (0.02, 0.21)	246 (-161, 653)	-61 (-220, 99)	-0.65 (-1.28, -0.02)
	5-day	0.29 (0.07, 0.50)	4.65 (1.93, 7.37)	67 (-46, 181)	0.10 (-0.02, 0.23)	138 (-377, 652)	9 (-195, 213)	-0.71 (-1.54, 0.12)
	7-day	0.49 (0.21, 0.78)	2.18 (-0.64, 5.01)	89 (-50, 228)	0.13 (-0.03, 0.29)	679 (29, 1329)	67 (-182, 315)	-0.56 (-1.61, 0.49)
	9-day	0.59 (0.25, 0.92)	2.92 (-0.35, 6.19)	134 (-36, 304)	0.15 (-0.04, 0.34)	792 (32, 1553)	263 (-33, 559)	-0.05 (-1.28, 1.17)
Black carbon	1-day	0.16 (0.02, 0.30)	1.19 (-0.52, 2.90)	38 (-26, 102)	0.02 (-0.06, 0.10)	252 (-54, 558)	-114 (-229, 1	-0.47 (-0.97, 0.03)
	3-day	0.19 (0.02, 0.35)	2.07 (-0.07, 4.20)	54 (-25, 134)	0.07 (-0.03, 0.16)	201 (-185, 587)	-95 (-240, 49)	-0.59 (-1.22, 0.03)
	5-day	0.21 (-0.02, 0.45)	3.43 (0.43, 6.43)	57 (-51, 166)	0.09 (-0.05, 0.22)	170 (-369, 708)	-52 (-250, 147)	-0.69 (-1.56, 0.18)
	7-day	0.19 (-0.10, 0.49)	3.80 (0.11, 7.48)	71 (-64, 205)	0.03 (-0.13, 0.20)	213 (-450, 876)	-61 (-307, 185)	-0.64 (-1.71, 0.44)
	9-day	0.18 (-0.14, 0.50)	4.76 (0.77, 8.75)	74 (-76, 223)	0.08 (-0.10, 0.26)	-34 (-761, 692)	86 (-186, 359)	-0.20 (-1.38, 0.99)
Organic Carbon	1-day	-0.02 (-0.38, 0.34)	-2.61 (-7.63, 2.41)	44 (-147, 234)	0.12 (-0.14, 0.37)	-818 (-1488, -147)	-105 (-442, 233)	-1.15 (-2.49, 0.18)
	3-day	-0.008 (-0.51, 0.49)	-2.00 (-7.92, 3.93)	132 (-124, 387)	0.14 (-0.18, 0.46)	-627 (-1608, 354)	-90 (-493, 313)	-1.27 (-2.81, 0.27)
	5-day	-0.02 (-0.53, 0.49)	-2.37 (-8.37, 3.64)	185 (-74, 444)	0.01 (-0.32, 0.34)	-648 (-1617, 322)	-7 (-405, 392)	-0.83 (-2.42, 0.76)
	7-day	-0.01 (-0.62, 0.59)	-4.37 (-10.08, 1.34)	257 (-63, 577)	-0.15 (-0.56, 0.26	-337 (-1501, 828)	-15 (-495, 465)	-1.19 (-3.14, 0.76)
	9-day	-0.10 (-0.73, 0.54)	-8.76 (-14.5, -3.00)	194 (-139, 527)	-0.01 (-0.44, 0.41)	-372 (-1608, 864)	73 (-440, 586)	-1.12 (-3.14, 0.90)
Primary OC	1-day	0.30 (-0.05, 0.66)	-1.95 (-7.06, 3.16)	42.4 (-143, 228)	0.17 (-0.08, 0.43)	-129 (-800, 541)	-251 (-596, 93)	-1.31 (-2.66, 0.04)
	3-day	0.50 (0.06, 0.94)	-1.53 (-6.87, 3.81)	313 (70, 555)	0.30 (0.03, 0.58)	629 (-279, 1536)	-230 (-611, 151)	-1.31 (-2.73, 0.10)
	5-day	0.48 (-0.06, 1.02)	-2.42 (-9.01, 4.18)	411 (98, 723)	0.28 (-0.07, 0.62)	424 (-706, 1555)	-60 (-540, 419)	-1.72 (-3.58, 0.15)
	7-day	0.60 (-0.01, 1.22)	-8.55 (-14.1, -2.98)	528 (168, 887)	0.26 (-0.15, 0.68)	960 (-236, 2156)	-8 (-521, 505)	-1.18 (-3.26, 0.89)
	9-day	0.66 (-0.07, 1.39)	-11.6 (-18.0, -5.20)	705 (261, 1149)	0.36 (-0.15, 0.86)	929 (-476, 2335)	296 (-312, 903)	-0.73 (-3.14, 1.68)
Secondary OC	1-day	-0.11 (-0.26, 0.04)	-0.68 (-2.92, 1.57)	13 (-58, 85.2)	0.00 (-0.10, 0.11)	-414 (-694, -134)	26 (-116, 168)	-0.37 (-0.93, 0.19)
	3-day	-0.17 (-0.37, 0.03)	0.53 (-2.00, 3.07)	-10 (-102, 81.9)	-0.04 (-0.16, 0.08)	-510 (-906, -114)	45 (-117, 206)	-0.31 (-0.92, 0.30)
	5-day	-0.13 (-0.35, 0.09)	1.45 (-1.32, 4.21)	29 (-67, 124)	-0.06 (-0.19, 0.07)	-461 (-882, -39)	33 (-136, 202)	-0.22 (-0.88, 0.44)
	7-day	-0.19 (-0.48, 0.09)	2.44 (-0.32, 5.20)	32 (-90, 154)	-0.15 (-0.32, 0.01)	-574 (-1158, 10)	32 (-194, 258)	-0.55 (-1.45, 0.34)
	9-day	-0.24 (-0.57, 0.09)	-1.51 (-4.57, 1.56)	12 (-147, 172)	-0.11 (-0.32, 0.09)	-613 (-1286, 60)	12 (-264, 289)	-0.83 (-1.89, 0.23)
CO	1-day	0.35 (0.17, 0.54)	3.33 (0.94, 5.73)	112 (13, 211)	0.05 (-0.05, 0.16)	780 (343, 1217)	-62 (-231, 108)	-0.69 (-1.41, 0.03)
	3-day	0.40 (0.20, 0.61)	3.65 (1.02, 6.29)	136 (29, 243)	0.09 (-0.03, 0.20)	739 (255, 1222)	-53 (-244, 138)	-0.69 (-1.48, 0.11)
	5-day	0.54 (0.27, 0.80)	5.28 (1.86, 8.70)	229 (88, 371)	0.14 (-0.01, 0.29)	1117 (485, 1749)	-37 (-285, 211)	-0.56 (-1.60, 0.48)
	7-day	0.34 (-0.06, 0.74)	11.2 (5.39, 17.0)	132 (-86, 349)	0.07 (-0.19, 0.33)	126 (-800, 1052)	98 (-314, 509)	-0.56 (-2.34, 1.21)
	9-day	0.31 (-0.07, 0.70)	10.4 (4.83, 16.0)	220 (19, 421)	0.14 (-0.11, 0.39)	41 (-840, 923)	208 (-173, 590)	0.05 (-1.63, 1.72)
NO_x	1-day	0.32 (0.17, 0.48)	2.11 (0.13, 4.08)	92 (11, 173)	0.01 (-0.08, 0.10)	651 (295, 1008)	-139 (-280, 3)	-0.24 (-0.84, 0.36)
	3-day	0.32 (0.14, 0.49)	3.17 (0.94, 5.41)	120 (26, 215)	0.06 (-0.04, 0.16)	566 (154, 978)	-133 (-298, 31)	-0.19 (-0.88, 0.50)
	5-day	0.42 (0.18, 0.66)	4.76 (1.73, 7.80)	153 (18, 289)	0.11 (-0.03, 0.25)	707 (136, 1278)	-97 (-330, 137)	-0.13 (-1.08, 0.83)
	7-day	0.56 (0.25, 0.87)	5.81 (1.99, 9.63)	198 (31, 366)	0.11 (-0.07, 0.29)	1081 (371, 1791)	-156 (-443, 131)	0.02 (-1.17, 1.22)
	9-day	0.54 (0.23, 0.85)	6.85 (2.92, 10.78)	251 (62, 441)	0.17 (-0.02, 0.35)	894 (141, 1647)	22 (-296, 340)	0.40 (-0.89, 1.68)

Table 3 (cont.)

Air Pollutant	Ave. time	IL-6 (pg/mL)	P-selectin (ng/mL)	TNF-RII (pg/mL)	TNF-α (pg/mL)	CRP (ng/mL)	SOD (U/g Hb)	GPx-1 (U/g Hb)
O_3	1-day	-0.16 (-0.39, 0.07)	-3.88 (-6.88, -0.89	-23 (-155, 110)	-0.01 (-0.15, 0.12)	-302 (-867, 264)	1 (-230, 232)	0.01 (-0.93, 0.94)
	3-day	-0.16 (-0.45, 0.12)	-4.39 (-7.93, -0.85	-63 (-226, 99)	0.02 (-0.15, 0.18)	-503 (-1176, 171)	3 (-275, 281)	-0.04 (-1.16, 1.09)
	5-day	-0.14 (-0.44, 0.17)	-3.40 (-7.04, 0.23	-55 (-215, 105)	-0.05 (-0.22, 0.13)	-556 (-1246, 134)	73 (-206, 352)	0.53 (-0.63, 1.69)
	7-day	-0.16 (-0.48, 0.16)	-3.39 (-7.23, 0.46	-56 (-219, 106)	-0.11 (-0.29, 0.07)	-740 (-1465, -16.3)	121 (-167, 408)	0.53 (-0.68, 1.75)
	9-day	-0.24 (-0.60, 0.11)	-5.55 (-9.75, -1.34	-104 (-292, 85)	-0.13 (-0.34, 0.07)	-843 (-1649, -38)	62 (-266, 391)	0.57 (-0.79, 1.94)
$PM_{0.25}$	1-day	0.30 (0.09, 0.51)	1.33 (-0.79, 3.44)	116 (15, 218)	-0.05 (-0.16, 0.05)	572 (80, 1064)	-136 (-318, 46)	-0.88 (-1.68, -0.08)
	3-day	0.42 (0.15, 0.69)	-1.26 (-4.09, 1.57)	152 (19, 284)	-0.04 (-0.18, 0.10)	748 (100, 1397)	-80 (-320, 160)	-0.94 (-1.97, 0.08)
	5-day	0.26 (-0.06, 0.57)	-0.33 (-4.20, 3.54)	125 (-40, 289)	0.05 (-0.13, 0.23)	292 (-437, 1021)	-16 (-303, 271)	-0.23 (-1.44, 0.97)
$PM_{0.25-2.5}$	1-day	-0.07 (-0.16, 0.02)	1.58 (0.45, 2.72)	-3 (-46, 39.0)	-0.01 (-0.05, 0.04)	-178 (-380, 24)	-46 (-123, 30)	-0.23 (-0.57, 0.10)
	3-day	-0.20 (-0.38, -0.02)	2.10 (-0.33, 4.53)	-17 (-107, 72.9)	-0.02 (-0.11, 0.08)	-422 (-821, -24)	-53 (-214, 108)	-0.47 (-1.17, 0.23)
	5-day	-0.19 (-0.36, -0.02)	1.60 (-0.57, 3.77)	-30 (-109, 49.9)	-0.08 (-0.17, 0.02)	-352 (-728, 24)	-19 (-161, 123)	-0.17 (-0.78, 0.44)
$PM_{2.5-10}$	1-day	0.11 (-0.03, 0.24)	-2.15 (-3.44, -0.86)	20 (-45, 85.6)	-0.04 (-0.11, 0.02)	252 (-59, 562)	-41 (-153, 72)	-0.48 (-0.98, 0.02)
	3-day	0.15 (-0.06, 0.35)	-3.18 (-5.30, -1.07)	39 (-70, 146)	0.02 (-0.07, 0.12)	4307 (-48, 908)	32 (-151, 214)	-0.94 (-1.76, -0.12)
	5-day	0.01 (-0.15, 0.17)	-1.14 (-3.13, 0.85)	-5 (-79, 69.1)	0.00 (-0.09, 0.09)	18 (-335, 370)	-36 (-169, 97)	-0.52 (-1.09, 0.05)

[a] Regression coefficients (95% confidence intervals) are for the expected change in the biomarker associated with an interquartile range change in the air pollutant (see Table 3 of manuscript).

Supplemental Material, Table 4. Associations of circulating biomarkers with outdoor air pollutants, Coeff. (95% CI)[a]: effect modification by study phase.

Air Pollutant	Ave. time	IL-6 (pg/mL)		sP-selectin (ng/mL)[b]		Cu,Zn-SOD[c] (U/g Hb)	
		Phase 1	Phase 2	Phase 1	Phase 2	Phase 1	Phase 2
Particle number	1-day	0.29 (0.03, 0.55)	0.40 (0.15, 0.66)	1.71 (-0.78, 4.20)	3.08 (0.45, 5.70)	-118 (-336, 100)	-88 (-302, 126)
	3-day	0.20 (-0.14, 0.53)	0.29 (0.00, 0.58)	1.49 (-1.68, 4.66)	3.78 (0.81, 6.74)	-165 (-424, 93)	-267 (-496, -37)
	5-day	0.11 (-0.26, 0.48)	0.31 (-0.04, 0.66)	-0.20 (-3.49, 3.08)	4.47 (1.37, 7.57)**	-82 (-358, 194)	-323 (-597, -50)
	7-day	-0.19 (-0.83, 0.45)	0.60 (0.14, 1.05)*	1.88 (-3.48, 7.23)	7.18 (3.27, 11.10)	-202 (-622, 218)	-552 (-868, -236)
	9-day	-0.33 (-1.12, 0.46)	0.69 (0.20, 1.19)**	3.01 (-3.47, 9.48)	7.56 (3.46, 11.66)	-205 (-728, 317)	-532 (-878, -186)
Elemental carbon	1-day	0.23 (-0.01, 0.46)	0.11 (-0.08, 0.30)	0.76 (-2.28, 3.80)	1.28 (-0.74, 3.31)	-209 (-406, -13)	-244 (-405, -83)
	3-day	0.18 (-0.13, 0.50)	0.28 (0.07, 0.49)	-0.43 (-4.06, 3.21)	1.03 (-0.71, 2.78)	-122 (-344, 99)	-296 (-457, -135)
	5-day	0.27 (-0.08, 0.62)	0.29 (0.01, 0.58)	-2.26 (-6.01, 1.49)	4.10 (1.58, 6.61)**	17 (-239, 273)	-405 (-635, -176)**
	7-day	0.31 (-0.04, 0.66)	0.81 (0.36, 1.26)*	1.06 (-2.83, 4.94)	5.57 (1.69, 9.46)*	12 (-241, 266)	-495 (-842, -147)**
	9-day	0.35 (-0.07, 0.78)	0.96 (0.43, 1.48)*	2.84 (-1.48, 7.16)	5.66 (1.22, 10.09)	69 (-253, 391)	-435 (-842, -29)**
Black carbon	1-day	0.24 (-0.04, 0.52)	0.13 (-0.02, 0.28)	1.58 (-1.67, 4.83)	0.22 (-1.20, 1.65)	-230 (-429, -31)	-175 (-281, -69)
	3-day	0.23 (-0.09, 0.56)	0.17 (-0.02, 0.36)	0.57 (-3.07, 4.21)	-0.10 (-1.87, 1.68)	-191 (-415, 32)	-211 (-352, -69)
	5-day	0.24 (-0.14, 0.63)	0.19 (-0.10, 0.49)	0.28 (-3.73, 4.29)	2.08 (-0.64, 4.81)	-76 (-342, 190)	-276 (-488, -64)
	7-day	0.33 (-0.10, 0.76)	0.11 (-0.27, 0.48)	1.11 (-3.30, 5.52)	2.57 (-0.94, 6.08)	-19 (-324, 287)	-302 (-568, -37)
	9-day	0.30 (-0.16, 0.76)	0.09 (-0.33, 0.51)	0.78 (-3.95, 5.50)	2.62 (-1.36, 6.61)	26 (-314, 365)	-231 (-533, 71)
Organic Carbon	1-day	0.06 (-0.43, 0.55)	-0.32 (-0.93, 0.29)	-0.50 (-5.63, 4.64)	-0.61 (-7.20, 5.99)	-154 (-559, 251)	-494 (-972, -16)
	3-day	-0.04 (-0.80, 0.73)	-0.17 (-0.95, 0.62)	-0.78 (-7.41, 5.86)	-0.49 (-7.73, 6.75)	-139 (-666, 389)	-534 (-1068, 1)
	5-day	0.27 (-0.56, 1.11)	-0.39 (-1.16, 0.39)	0.96 (-6.82, 8.74)	5.94 (-1.77, 13.64)	-2 (-574, 569)	-336 (-853, 181)
	7-day	0.45 (-0.54, 1.45)	-0.66 (-1.68, 0.35)	1.59 (-7.43, 10.61)	2.67 (-7.13, 12.47)	139 (-576, 854)	-251 (-946, 445)
	9-day	0.29 (-0.56, 1.15)	-1.50 (-2.88, -0.13)**	4.87 (-4.21, 13.96)	5.24 (-6.84, 17.32)	129 (-475, 733)	-170 (-1151, 812)
Primary OC	1-day	0.43 (-0.09, 0.96)	0.14 (-0.35, 0.63)	1.77 (-5.02, 8.56)	1.79 (-3.46, 7.04)	-391 (-840, 57)	-566 (-968, -164)
	3-day	0.26 (-0.47, 0.99)	0.61 (0.05, 1.16)	3.46 (-6.87, 13.79)	9.81 (0.96, 18.67)	-300 (-828, 227)	-705 (-1123, -288)
	5-day	0.44 (-0.35, 1.22)	0.50 (-0.28, 1.27)	-3.59 (-11.86, 4.68)	9.87 (2.89, 16.86)**	-10 (-603, 583)	-883 (-1485, -281)**
	7-day	0.43 (-0.34, 1.20)	1.08 (-0.04, 2.20)	0.69 (-7.26, 8.64)	9.27 (-1.55, 20.08)	19 (-557, 595)	-879 (-1707, -52)*
	9-day	0.51 (-0.44, 1.46)	1.05 (-0.26, 2.36)	3.20 (-5.84, 12.25)	8.01 (-4.72, 20.73)	167 (-560, 894)	-596 (-1562, 371)

Table 4 (cont.)

Air Pollutant	Ave. time	IL-6 (pg/mL)		sP-selectin (ng/mL)[a]		Cu,Zn-SOD[b] (U/g Hb)	
		Phase 1	Phase 2	Phase 1	Phase 2	Phase 1	Phase 2
Secondary OC	1-day	-0.04 (-0.22, 0.14)	-0.29 (-0.57, -0.00)	-0.05 (-1.95, 1.86)	-1.87 (-4.97, 1.23)	6 (-140, 152)	-15 (-234, 204)
	3-day	0.00 (-0.26, 0.26)	-0.43 (-0.75, -0.10)**	-0.39 (-2.59, 1.81)	-1.35 (-4.45, 1.74)	20 (-165, 205)	67 (-140, 275)
	5-day	0.05 (-0.26, 0.37)	-0.30 (-0.60, -0.00)	0.28 (-2.58, 3.13)	-0.02 (-3.06, 3.02)	26 (-189, 242)	28 (-166, 222)
	7-day	0.19 (-0.26, 0.64)	-0.46 (-0.83, -0.09)**	-0.60 (-4.74, 3.53)	-0.70 (-4.14, 2.73)	102 (-215, 420)	59 (-191, 310)
	9-day	0.23 (-0.22, 0.68)	-0.88 (-1.36, -0.39)**	0.59 (-4.17, 5.35)	0.20 (-3.84, 4.24)	-7 (-329, 314)	121 (-240, 483)
CO	1-day	0.17 (-0.09, 0.44)	0.47 (0.24, 0.71)	0.56 (-2.21, 3.33)	1.34 (-0.93, 3.60)	-187 (-410, 36)	-207 (-382, -33)
	3-day	0.32 (-0.05, 0.68)	0.43 (0.19, 0.68)	0.13 (-3.61, 3.87)	0.99 (-1.28, 3.27)	-261 (-547, 25)	-242 (-425, -59)
	5-day	0.50 (-0.05, 1.05)	0.55 (0.25, 0.85)	1.91 (-3.51, 7.33)	1.93 (-0.84, 4.70)	-184 (-599, 231)	-260 (-482, -39)
	7-day	0.48 (0.00, 0.96)	0.12 (-0.48, 0.72)	2.53 (-2.76, 7.83)	9.20 (2.67, 15.74)*	-216 (-636, 205)	-533 (-1067, 1)
	9-day	0.42 (-0.05, 0.89)	0.13 (-0.49, 0.75)	1.51 (-3.70, 6.72)	8.77 (2.01, 15.54)*	-193 (-605, 219)	-178 (-702, 346)
NO_x	1-day	0.38 (0.09, 0.67)	0.30 (0.12, 0.47)	1.71 (-1.19, 4.60)	1.15 (-0.53, 2.83)	-199 (-437, 39)	-175 (-302, -48)
	3-day	0.44 (0.07, 0.81)	0.28 (0.08, 0.48)	1.28 (-2.21, 4.76)	1.19 (-0.65, 3.04)	-218 (-511, 74)	-244 (-391, -97)
	5-day	0.50 (0.04, 0.95)	0.39 (0.10, 0.68)	0.62 (-3.57, 4.82)	3.14 (0.49, 5.79)	-124 (-486, 238)	-346 (-563, -129)
	7-day	0.64 (0.09, 1.19)	0.55 (0.18, 0.92)	1.36 (-3.70, 6.42)	4.16 (0.76, 7.56)	-83 (-523, 356)	-443 (-711, -175)
	9-day	0.56 (0.03, 1.09)	0.55 (0.16, 0.94)	0.57 (-4.37, 5.52)	4.81 (1.21, 8.41)	-20 (-458, 418)	-375 (-685, -66)
$PM_{0.25}$	1-day	0.23 (-0.10, 0.57)	0.31 (0.05, 0.57)	2.68 (-0.70, 6.05)	0.53 (-1.92, 2.99)	-333 (-577, -88)	-193 (-378, -7)
	3-day	0.19 (-0.30, 0.68)	0.50 (0.17, 0.84)	2.17 (-3.46, 7.79)	-0.01 (-3.50, 3.48)	-440 (-804, -76)	-204 (-446, 37)
	5-day	0.19 (-0.30, 0.68)	0.50 (0.17, 0.84)	0.55 (-4.31, 5.42)	3.29 (-1.07, 7.66)	-200 (-540, 140)	-205 (-538, 128)
$PM_{0.25-2.5}$	1-day	-0.02 (-0.25, 0.20)	-0.08 (-0.18, 0.01)	0.30 (-1.90, 2.51)	0.44 (-0.45, 1.33)	-16 (-180, 147)	-104 (-180, -27)
	3-day	-0.11 (-0.44, 0.23)	-0.24 (-0.45, -0.02)	-0.24 (-3.84, 3.36)	0.30 (-1.87, 2.47)	-88 (-336, 161)	-106 (-284, 72)
	5-day	-0.11 (-0.44, 0.23)	-0.24 (-0.45, -0.02)	-0.21 (-4.23, 3.80)	-0.43 (-2.19, 1.34)	57 (-225, 339)	-1 (-137, 136)
$PM_{2.5-10}$	1-day	0.09 (-0.07, 0.24)	0.13 (-0.10, 0.36)	1.67 (-0.87, 4.20)	-0.99 (-3.45, 1.47)	-79 (-189, 31)	-109 (-270, 52)
	3-day	0.03 (-0.22, 0.28)	0.33 (-0.02, 0.67)	0.61 (-2.65, 3.88)	-1.24 (-4.60, 2.12)	-147 (-335, 42)	-4 (-258, 250)
	5-day	0.03 (-0.22, 0.28)	0.33 (-0.02, 0.67)	0.07 (-3.02, 3.15)	0.61 (-1.31, 2.54)	-115 (-278, 48)	-53 (-204, 98)

[a] Regression coefficients and 95% confidence intervals are for the expected change in the biomarker associated with an interquartile range change in the air pollutant (see Table 3 of manuscript). Phase 1 is a warmer period of greater photochemical activity, and phase 2 is a cooler period of greater air stagnation. For regression results including both phases, see Table 3 above for IL-6 and Cu,Zn-SOD, and Table 5 below for sP-selectin. * product term p-value < 0.1; ** product term p-value < 0.05.

[b] Models for sP-selectin are restricted to the 44 subjects living in the San Gabriel Valley.

[c] Cu,Zn-SOD models are restricted to 55 subjects with negative responses to air pollution.

Supplemental Material, Table 5. Associations of circulating biomarkers with outdoor air pollutants Coeff. (95% CI)[a] among 44 subjects living in the San Gabriel Valley: effect modification by medication use.

Air Pollutant		TNF-RII (pg/mL)			sP-selectin (ng/mL)		
	Ave. time	All subjects	Statins	No Statins	All subjects	Clopidogrel	No Clopidogrel
Particle number	1-day	146 (14, 277)	226 (29, 424)	81 (-94, 257)	1.65 (-1.18, 4.49)	2.21 (-0.69, 5.11)	2.49 (0.24, 4.73)
	3-day	149 (0, 298)	32 (-195, 259)	236 (39, 432	3.07 (-0.20, 6.33)	1.97 (-1.56, 5.50)	3.03 (0.31, 5.75)
	5-day	143 (-22, 308)	46 (-210, 301)	211 (-3, 424)	3.06 (-0.46, 6.58)	0.48 (-3.12, 4.07)	3.22 (0.37, 6.07)
	7-day	153 (-84, 391)	-10 (-370, 350)	273 (-37, 583	5.50 (0.51, 10.49)	2.07 (-2.71, 6.85)	6.70 (2.85, 10.55)
	9-day	186 (-83, 455)	-13 (-411, 384)	339 (-13.0, 690)	7.11 (1.60, 12.63)	2.97 (-2.20, 8.14)	7.50 (3.40, 11.6)
Elemental carbon	1-day	2 (-81, 85)	41 (-76, 158)	-32.6 (-148, 82)	3.00 (0.70, 5.31)	-0.74 (-3.37, 1.88)	2.30 (0.19, 4.41)*
	3-day	97 (-6, 200)	-40 (-185, 106)**	216 (76, 356)	3.08 (0.85, 5.30)	-0.63 (-3.18, 1.92)	1.67 (-0.31, 3.65)
	5-day	112 (-25, 248)	-21 (-219, 176)*	224 (39.0, 409)	4.94 (2.12, 7.76)	-0.27 (-3.54, 3.00)	3.71 (1.07, 6.34)*
	7-day	184 (2, 365)	38 (-217, 293)	297 (67, 528)	3.25 (0.46, 6.03)	0.81 (-3.55, 5.17)	4.71 (1.28, 8.14)
	9-day	222 (21, 423)	107 (-174, 388)	321 (60.0, 581)	3.77 (0.70, 6.83)	1.68 (-3.22, 6.59)	4.95 (1.21, 8.69)
Black carbon	1-day	53 (-21, 126)	-18 (-119, 84)	121 (21.0, 221)*	1.81 (0.03, 3.58)	-0.70 (-2.84, 1.45)	1.08 (-0.52, 2.68)
	3-day	79 (-13, 171)	-43 (-172, 86)	192 (67, 318)**	1.92 (-0.29, 4.12)	-1.15 (-3.78, 1.48)	0.75 (-1.24, 2.74)
	5-day	90 (-35, 215)	-68 (-249, 113)	223 (55.0, 390)**	3.37 (0.25, 6.48)	-0.94 (-4.65, 2.76)	2.93 (0.14, 5.71)*
	7-day	113 (-42, 268)	-72 (-292, 148)	262 (62, 463)**	3.48 (-0.40, 7.35)	-0.87 (-5.35, 3.62)	3.55 (0.16, 6.94)
	9-day	121 (-52, 293)	-31 (-276, 215)	248 (21.0, 476)*	4.44 (0.20, 8.68)	-0.40 (-5.38, 4.58)	3.12 (-0.62, 6.86)
Organic Carbon	1-day	14 (-181, 210)	-19 (-303, 264)	40.6 (-215, 296)	1.86 (-3.25, 6.97)	-2.79 (-8.89, 3.31)	1.59 (-3.01, 6.19)
	3-day	125 (-146, 395)	50 (-336, 436)	184 (-169, 537)	3.64 (-2.56, 9.84)	-1.37 (-8.57, 5.83)	1.34 (-4.14, 6.81)
	5-day	144 (-133, 421)	111 (-289, 511)	166 (-191, 523)	6.08 (-0.61, 12.77)	0.95 (-7.07, 8.97)	4.88 (-1.24, 11.0)
	7-day	225 (-131, 581)	284 (-212, 781)	179 (-258, 617)	2.77 (-3.08, 8.63)	-0.34 (-9.30, 8.61)	4.55 (-2.47, 11.56)
	9-day	255 (-173, 684)	283 (-306, 873)	236 (-279, 751)	3.57 (-2.64, 9.78)	0.32 (-8.97, 9.62)	5.51 (-1.93, 13.0)
Primary OC	1-day	47 (-155, 249)	130 (-153, 413)	-22.5 (-300, 255)	5.97 (0.50, 11.44)	-3.09 (-9.28, 3.09)	5.17 (0.20, 10.1)**
	3-day	301 (48, 555)	-19 (-372, 333)	576 (241, 911)**	5.23 (-0.28, 10.75)	-3.18 (-9.36, 2.99)	2.98 (-1.81, 7.76)
	5-day	338 (3, 673)	52 (-419, 522)	572 (136, 1008)*	10.51 (3.41, 17.60)	-2.20 (-10.18, 5.77)	8.55 (2.14, 15.0)**
	7-day	503 (96, 910)	286 (-269, 841)	664 (171, 1157)	4.12 (-1.99, 10.23)	-1.78 (-10.76, 7.21)	7.66 (0.42, 14.91)*
	9-day	605 (128, 1082)	422 (-225, 1069)	745 (168, 1322)	4.38 (-2.56, 11.32)	-1.55 (-11.80, 8.70)	7.86 (-0.31, 16.0)
Secondary OC	1-day	-4 (-79, 72)	-44 (-157, 69)	25.9 (-74, 126)	-1.24 (-3.37, 0.90)	-1.23 (-3.86, 1.40)	-0.92 (-2.82, 0.99)
	3-day	-19 (-116, 78)	41 (-103, 184)	-69 (-198, 61)	-1.06 (-3.50, 1.38)	-0.32 (-3.30, 2.66)	-1.15 (-3.29, 0.99)
	5-day	15 (-90, 120)	54 (-100, 208)	-17.9 (-156, 121)	-0.56 (-3.34, 2.23)	0.41 (-3.02, 3.85)	-0.45 (-2.96, 2.06)
	7-day	16 (-120, 152)	106 (-89, 301)	-57 (-233, 120)	-0.71 (-3.36, 1.95)	-0.56 (-4.71, 3.58)	-0.76 (-3.95, 2.44)
	9-day	1 (-194, 197)	84 (-193, 360)	-60.8 (-306, 184)	0.20 (-2.88, 3.29)	0.13 (-4.55, 4.80)	0.29 (-3.41, 4.00)

Table 5 (cont.)

Air Pollutant	Ave. time	TNF-RII (pg/mL)			sP-selectin (ng/mL)[a]		
		All subjects	Statins	No Statins	All subjects	Clopidogrel	No Clopidogrel
CO	1-day	125 (11, 239)	48 (-105, 201)	199 (47, 352)	1.84 (-0.62, 4.30)	0.00 (-2.80, 2.81)	1.72 (-0.42, 3.86)
	3-day	161 (39, 283)	1 (-170, 171)	306 (141, 472)**	1.90 (-0.79, 4.60)	-0.67 (-3.95, 2.60)	1.60 (-0.76, 3.96)
	5-day	257 (100, 413)	15 (-210, 240)	445 (240, 649)**	2.97 (-0.47, 6.41)	-0.18 (-4.38, 4.01)	3.04 (0.06, 6.01)
	7-day	176 (-68, 419)	43 (-297, 382)	283 (-23, 589)	6.74 (0.75, 12.73)	2.24 (-4.22, 8.71)	6.78 (1.60, 11.96)
	9-day	265 (41, 489)	160 (-158, 478)	355 (65.0, 646)	6.96 (1.20, 12.72)	2.04 (-4.40, 8.48)	5.54 (0.46, 10.6)
NO_x	1-day	99 (8, 189)	44 (-82, 171)	146 (27.0, 264)	2.04 (0.06, 4.02)	0.20 (-2.14, 2.54)	1.79 (0.03, 3.55)
	3-day	127 (23, 231)	-7 (-152, 138)	242 (104, 379)**	2.72 (0.51, 4.94)	-0.14 (-2.88, 2.60)	1.95 (-0.03, 3.93)
	5-day	168 (19, 316)	0.70 (-213, 214)	302 (107, 498)**	4.34 (1.33, 7.35)	0.54 (-3.10, 4.19)	3.47 (0.74, 6.19)
	7-day	224 (38, 410)	5 (-257, 268)	398 (159, 637)**	5.13 (1.34, 8.93)	0.69 (-3.90, 5.29)	4.64 (1.20, 8.07)
	9-day	283 (73, 493)	120 (-178, 417)	418 (145, 692)	6.00 (2.10, 9.90)	0.82 (-3.89, 5.53)	4.64 (1.13, 8.15)
$PM_{0.25}$	1-day	159 (40, 278)	42 (-132, 215)	254 (97.0, 411)*	1.40 (-0.55, 3.35)	0.82 (-2.55, 4.19)	1.69 (-0.69, 4.07)
	3-day	200 (34, 365)	-99 (-336, 138)	444 (227, 661)**	0.86 (-1.92, 3.64)	0.19 (-4.56, 4.94)	1.23 (-2.20, 4.67)
	5-day	138 (-56, 332)	-119 (-394, 156)	350 (96, 604)**	4.50 (0.16, 8.84)	-0.46 (-5.49, 4.56)	3.63 (-0.29, 7.55)
$PM_{0.25-2.5}$	1-day	-2 (-49, 45)	-43 (-108, 21)	45.0 (-24.0, 114)*	2.02 (0.89, 3.14)	0.16 (-1.13, 1.45)	0.54 (-0.51, 1.59)
	3-day	-8 (-112, 96)	-93 (-238, 52)	80.4 (-70.0, 231)	3.02 (0.46, 5.58)	0.39 (-2.63, 3.41)	-0.15 (-2.41, 2.11)
	5-day	-26 (-116, 64)	-75 (-205, 55)	18 (-106, 141)	0.20 (-2.03, 2.43)	-2.43 (-5.05, 0.20)	0.79 (-1.21, 2.79)*
$PM_{2.5-10}$	1-day	40 (-62, 143)	21 (-126, 167)	58.5 (-82.0, 199)	0.41 (-1.32, 2.14)	0.10 (-2.89, 3.08)	0.55 (-1.55, 2.64)
	3-day	85 (-72, 242)	46 (-182, 273)	121 (-97.0, 339)	-0.38 (-2.66, 1.90)	0.57 (-3.42, 4.56)	-0.80 (-3.57, 1.98)
	5-day	13 (-85, 111)	-46 (-187, 96)	66 (-69, 201)	0.24 (-2.05, 2.52)	-1.73 (-4.42, 0.96)	1.61 (-0.41, 3.63)*

[a] Regression coefficient and 95% confidence intervals are for the expected change in the biomarker associated with an interquartile range change in the air pollutant (see Table 3 of manuscript). 31 Subjects were taking statins, 29 no statins, 21 were taking clopidogrel, 39 no clopidogrel.

* product term p-value < 0.1; ** product term p-value < 0.05.

Supplemental Material, Table 6. Differences in associations of TNF-α and CRP with outdoor air pollutants by mean biomarker concentrations.

		TNF-α (pg/mL)		CRP (ng/mL)	
Air Pollutant	**Ave. time**	**Lower 75th percentile Coeff. (95% CI)[a]**	**Upper 25th percentile Coeff. (95% CI)**	**Lower 75th percentile Coeff. (95% CI)[a]**	**Upper 25th percentile Coeff. (95% CI)**
Particle number	1-day	0.013 (-0.052, 0.079)	0.286 (-0.051, 0.623)	-5 (-223, 212)	1240 (-86, 2567)
	3-day	0.006 (-0.071, 0.083)	0.501 (0.122, 0.879)	-134 (-373, 106)	517 (-1216, 2250)
	5-day	-0.038 (-0.126, 0.049)	0.689 (0.246, 1.132)	-209 (-485, 67.7)	628 (-1213, 2468)
	7-day	0.006 (-0.114, 0.125)	0.601 (-0.091, 1.292)	-153 (-535, 229)	1969 (-633, 4571)
	9-day	0.019 (-0.111, 0.149)	0.608 (-0.176, 1.392)	-154 (-564, 256)	2499 (-361, 5359)
Elemental carbon	1-day	-0.026 (-0.075, 0.024)	0.366 (0.060, 0.673)	-43 (-214, 128)	-618 (-1876, 640)
	3-day	0.000 (-0.054, 0.054)	0.382 (0.071, 0.693)	-70 (-254, 113)	1018 (-335, 2372)
	5-day	-0.019 (-0.089, 0.050)	0.508 (0.123, 0.894)	-21 (-250, 208)	440 (-1409, 2290)
	7-day	0.013 (-0.076, 0.101)	0.422 (-0.059, 0.903)	87 (-210, 383)	2007 (-170, 4184)
	9-day	0.017 (-0.085, 0.118)	0.581 (-0.014, 1.177)	74 (-270, 417)	2471 (-5, 4946)
Black carbon	1-day	-0.013 (-0.054, 0.029)	0.078 (-0.165, 0.320)	-28 (-169, 112)	858 (-141, 1857)
	3-day	0.007 (-0.046, 0.059)	0.171 (-0.118, 0.461)	-53 (-230, 124)	678 (-608, 1965)
	5-day	0.004 (-0.069, 0.077)	0.339 (-0.054, 0.732)	-14 (-267, 238)	317 (-1431, 2066)
	7-day	0.004 (-0.086, 0.095)	0.195 (-0.293, 0.684)	25 (-287, 337)	246 (-1814, 2306)
	9-day	-0.003 (-0.102, 0.097)	0.449 (-0.092, 0.989)	-4 (-337, 329)	-510 (-2823, 1803)
Organic Carbon	1-day	-0.064 (-0.178, 0.050)	0.687 (0.014, 1.359)	-288 (-666, 90)	-3056 (-5301, -812)
	3-day	-0.034 (-0.176, 0.107)	0.562 (-0.267, 1.392)	-422 (-880, 35)	-2073 (-5405, 1258)
	5-day	-0.072 (-0.216, 0.072)	0.313 (-0.504, 1.130)	-352 (-804, 99)	-2913 (-6292, 466)
	7-day	-0.061 (-0.240, 0.118)	-0.097 (-1.110, 0.915)	-210 (-731, 312)	-2397 (-6370, 1575)
	9-day	-0.093 (-0.274, 0.089)	0.415 (-0.654, 1.485)	-138 (-692, 416)	-2462 (-6759, 1834)
Primary OC	1-day	-0.049 (-0.159, 0.061)	0.686 (-0.028, 1.400)	-158 (-528, 212)	-1073 (-3824, 1679)
	3-day	0.006 (-0.120, 0.131)	0.834 (0.061, 1.607)	-254 (-671, 163)	2036 (-983, 5056)
	5-day	-0.062 (-0.223, 0.100)	1.058 (0.112, 2.004)	-236 (-742, 269)	-236 (-4231, 3759)
	7-day	-0.005 (-0.188, 0.177)	0.637 (-0.441, 1.715)	-86 (-621, 449)	1351 (-2683, 5385)
	9-day	-0.031 (-0.241, 0.179)	0.984 (-0.320, 2.288)	-81 (-713, 551)	1736 (-2892, 6365)
Secondary OC	1-day	0.005 (-0.025, 0.036)	-0.038 (-0.185, 0.109)	-45 (-139, 49)	-868 (-1648, -88)
	3-day	0.007 (-0.024, 0.039)	-0.092 (-0.240, 0.056)	-43 (-136, 50)	-1068 (-2063, -73)
	5-day	0.007 (-0.025, 0.039)	-0.105 (-0.252, 0.042)	-132 (-348, 84)	-2043 (-3376, -710)
	7-day	-0.018 (-0.094, 0.058)	-0.251 (-0.720, 0.217)	-92 (-378, 193)	-2723 (-4568, -879)
	9-day	-0.042 (-0.132, 0.048)	0.022 (-0.545, 0.588)	-83 (-404, 238)	-3394 (-5626, -1162)
CO	1-day	-0.026 (-0.088, 0.035)	0.217 (-0.127, 0.561)	32 (-171, 235)	2280 (930, 3630)
	3-day	-0.011 (-0.079, 0.056)	0.297 (-0.076, 0.669)	3 (-223, 230)	2114 (608, 3620)
	5-day	-0.015 (-0.103, 0.074)	0.573 (0.105, 1.041)	1 (-307, 309)	2684 (843, 4525)
	7-day	-0.015 (-0.161, 0.131)	0.701 (-0.137, 1.539)	123 (-370, 617)	189 (-2832, 3211)
	9-day	0.010 (-0.126, 0.145)	0.983 (0.175, 1.792)	66 (-403, 536)	-61 (-2936, 2814)

Table 6 (cont.)

Air Pollutant	Ave. time	TNF-α (pg/mL) Lower 75th percentile Coeff. (95% CI)[a]	TNF-α (pg/mL) Upper 25th percentile Coeff. (95% CI)	CRP (ng/mL) Lower 75th percentile Coeff. (95% CI)[a]	CRP (ng/mL) Upper 25th percentile Coeff. (95% CI)
NO_x	1-day	-0.028 (-0.079, 0.022)	0.059 (-0.222, 0.340)	26 (-147, 198)	1565 (521, 2609)
	3-day	-0.020 (-0.079, 0.038)	0.250 (-0.069, 0.569)	-26 (-222, 170)	1339 (109, 2568)
	5-day	-0.040 (-0.121, 0.041)	0.621 (0.182, 1.059)	-18 (-282, 247)	1689 (-72, 3449)
	7-day	-0.028 (-0.130, 0.074)	0.580 (0.032, 1.128)	31 (-305, 367)	2432 (340, 4524)
	9-day	-0.029 (-0.139, 0.082)	0.916 (0.338, 1.494)	17 (-324, 358)	1935 (-397, 4268)
$PM_{0.25}$	1-day	-0.031 (-0.095, 0.033)	-0.096 (-0.433, 0.241)	33 (-179, 245)	2175 (470, 3879)
	3-day	-0.032 (-0.116, 0.052)	-0.066 (-0.506, 0.374)	-33 (-311, 244)	3162 (887, 5438)
	5-day	-0.075 (-0.176, 0.026)	0.294 (-0.262, 0.850)	-245 (-564, 75)	1877 (-735, 4489)
$PM_{0.25-2.5}$	1-day	-0.015 (-0.039, 0.010)	0.053 (-0.116, 0.221)	-89 (-180, 1)	-489 (-1255, 276)
	3-day	-0.010 (-0.061, 0.041)	0.039 (-0.307, 0.385)	-222 (-404, -41)	-1057 (-2605, 491)
	5-day	0.030 (-0.020, 0.080)	-0.275 (-0.575, 0.024)	-81 (-254, 92)	-1181 (-2504, 142)
$PM_{2.5-10}$	1-day	0.004 (-0.036, 0.044)	-0.146 (-0.341, 0.048)	-22 (-153, 108)	1239 (-45.2, 2523)
	3-day	0.041 (-0.021, 0.102)	0.006 (-0.296, 0.308)	-67 (-266, 132)	1814 (-44.9, 3672)
	5-day	0.023 (-0.025, 0.070)	-0.045 (-0.310, 0.220)	-59 (-219, 100)	141 (-1273, 1555)

[a] Regression coefficient and 95% confidence intervals are for the expected change in the biomarker associated with an interquartile range change in the air pollutant (see Table 3 of manuscript). 45 subjects were in the lower 75th percentile and 15 were in the upper 25th percentile of the distribution of subject mean TNF-α and CRP