

## ONLINE SUPPLEMENT

### **Ambient Particulate Matter and the Response to Orthostatic Challenge in the Elderly: The MOBILIZE Boston Study.**

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**Table S1:** Mean ( $\pm$ SD) blood pressure and pulse rate during supine rest and 1 and 3 after standing among 747 participants from the MOBILIZE Boston Study evaluated repeatedly.\*

Blood Pressure Measurement	Diastolic Blood Pressure (mmHg)	Systolic Blood Pressure (mmHg)	Heart Rate (beats per minute)
Supine	70.2 $\pm$ 8.8	130.6 $\pm$ 18.2	65.7 $\pm$ 8.6
1-min after standing	72.1 $\pm$ 9.5	129.2 $\pm$ 19.7	68.7 $\pm$ 9.7
3-min after standing	72.9 $\pm$ 9.2	131.6 $\pm$ 18.7	68.2 $\pm$ 9.3
Change 1-min after standing	1.9 $\pm$ 6.7	-1.4 $\pm$ 13.4	3.1 $\pm$ 5.6
Change 3-min after standing	2.6 $\pm$ 6.8	1.0 $\pm$ 11.9	2.6 $\pm$ 5.4

\*Change in blood pressure and pulse rate is calculated as the standing value minus the supine value such that a positive change denotes an increase in pressure or rate upon standing. Outcomes were available in >97% of the 1,362 subject measurements.

**Table S2:** Change in  $\Delta$ SBP and  $\Delta$ DBP 1 minute after standing from supine rest, supine SBP and supine DBP associated with an interquartile range increase in ambient levels of PM<sub>2.5</sub>, black carbon and sulfate over different averaging periods.\*

Moving Average (Days)	IQR ( $\mu\text{g}/\text{m}^3$ )	Change in $\Delta$ SBP (95% CI)	Change in $\Delta$ DBP (95% CI)	Change in supine SBP (95% CI)	Change in supine DBP (95% CI)
<u>PM<sub>2.5</sub></u>					
1	4.9	0.1 (-0.8, 1.0)	0.1 (-0.4, 0.6)	0.2 (-0.7, 1.0)	-0.4 (-0.9, 0.1)
3	4.4	0.3 (-0.8, 1.5)	0.3 (-0.3, 0.9)	-0.3 (-1.3, 0.7)	-0.2 (-0.8, 0.5)
5	3.9	0.9 (-0.3, 2.1)	0.4 (-0.3, 1.0)	-0.4 (-1.4, 0.7)	0.1 (-0.6, 0.8)
7	3.8	1.4 (0.0, 2.8) <sup>†</sup>	0.7 (0.0, 1.4)	-0.3 (-1.5, 1.0)	0.1 (-0.6, 0.9)
14	3.4	1.5 (0.0, 3.0) <sup>†</sup>	0.7 (0.0, 1.5)	0.2 (-1.1, 1.5)	0.7 (-0.1, 1.5)
21	3.1	1.0 (-0.5, 2.5)	0.4 (-0.4, 1.2)	0.4 (-1.0, 1.7)	0.9 (0.1, 1.8) <sup>†</sup>
28	2.9	0.8 (-0.8, 2.4)	0.2 (-0.6, 1.0)	0.3 (-1.1, 1.7)	1.0 (0.1, 1.9) <sup>†</sup>
<u>Black Carbon</u>					
1	0.42	0.4 (-0.6, 1.4)	0.5 (0.0, 1.0)	-0.6 (-1.5, 0.3)	-0.4 (-0.9, 0.2)
3	0.33	-0.1 (-1.3, 1.2)	0.2 (-0.4, 0.9)	-0.4 (-1.5, 0.7)	-0.2 (-0.8, 0.5)
5	0.28	0.4 (-0.9, 1.6)	0.2 (-0.5, 0.9)	0.0 (-1.1, 1.1)	0.2 (-0.5, 0.9)
7	0.25	0.7 (-0.6, 2.0)	0.4 (-0.3, 1.1)	0.1 (-1.0, 1.3)	0.2 (-0.5, 0.9)
14	0.24	1.2 (-0.4, 2.8)	0.6 (-0.2, 1.5)	0.2 (-1.2, 1.6)	0.7 (-0.1, 1.6)
21	0.24	1.1 (-0.8, 3.0)	0.3 (-0.7, 1.3)	0.3 (-1.3, 2.0)	1.2 (0.2, 2.2) <sup>†</sup>
28	0.22	1.0 (-0.9, 3.0)	0.2 (-0.9, 1.2)	0.8 (-0.9, 2.6)	1.4 (0.3, 2.5) <sup>†</sup>
<u>Sulfate</u>					
1	1.7	0.2 (-0.7, 1.0)	0.1 (-0.4, 0.5)	0.8 (0.0, 1.5) <sup>†</sup>	-0.1 (-0.5, 0.4)
3	1.5	0.0 (-1.0, 0.9)	0.2 (-0.2, 0.7)	0.5 (-0.4, 1.3)	0.0 (-0.5, 0.6)
5	1.4	0.1 (-1.0, 1.1)	0.1 (-0.4, 0.7)	0.5 (-0.4, 1.5)	0.3 (-0.3, 0.8)
7	1.4	0.3 (-1.0, 1.5)	0.4 (-0.3, 1.0)	0.6 (-0.5, 1.7)	0.1 (-0.5, 0.8)
14	1.2	0.6 (-0.8, 1.9)	0.3 (-0.4, 1.0)	0.8 (-0.4, 2.0)	0.5 (-0.2, 1.3)
21	1.1	0.7 (-0.8, 2.2)	0.2 (-0.6, 0.9)	0.6 (-0.7, 1.9)	0.7 (-0.1, 1.6)
28	1.0	0.7 (-0.9, 2.3)	0.2 (-0.6, 1.0)	1.0 (-0.3, 2.4)	0.9 (0.0, 1.7) <sup>†</sup>

\*Results from single pollutant mixed effects models controlling for age, sex, race, smoking, hypertension, diabetes, body mass index, visit number, season, day of week, ambient temperature and dew point temperature, and time. For the 1 day moving average, the Pearson correlations were 0.66 for PM<sub>2.5</sub> and black carbon, 0.82 for PM<sub>2.5</sub> and sulfate, and 0.55 for black carbon and sulfate. Symbols: IQR = Interquartile range; <sup>†</sup> = p<0.05.

**Table S3:** Change in  $\Delta$ SBP and  $\Delta$ DBP 3 minutes after standing from supine rest associated with an interquartile range increase in  $PM_{2.5}$  levels over different averaging periods.\*

Moving Average (Days)	IQR ( $\mu g/m^3$ )	Change in $\Delta$ SBP (95% CI)	p-value	Change in $\Delta$ DBP (95% CI)	p-value
1	4.9	-0.1 (-1.0, 0.7)	0.74	-0.1 (-0.6, 0.4)	0.68
3	4.4	-0.3 (-1.3, 0.7)	0.58	0.1 (-0.5, 0.7)	0.81
5	3.9	0.2 (-0.8, 1.3)	0.69	0.0 (-0.6, 0.7)	0.91
7	3.8	0.6 (-0.6, 1.8)	0.30	0.3 (-0.4, 1.0)	0.39
14	3.4	0.7 (-0.6, 2.0)	0.31	0.5 (-0.3, 1.3)	0.21
21	3.1	0.5 (-0.9, 1.8)	0.47	0.1 (-0.7, 0.9)	0.88
28	2.9	0.6 (-0.8, 2.0)	0.41	0.0 (-0.9, 0.8)	0.94

\*Results from mixed effects models controlling for age, sex, race, smoking, hypertension, diabetes, body mass index, visit number, season, day of week, ambient temperature and dew point temperature, and time. Symbols: IQR=Interquartile range

**Table S4:** Change in  $\Delta$ SBP and  $\Delta$ DBP 1 minute after standing associated with an interquartile range increase in mean  $PM_{2.5}$  levels over the 7 days prior to evaluation.

Participant Subgroup	Change in $\Delta$ SBP (95% CI)	$P_h$	Change in $\Delta$ DBP (95% CI)	$P_h$
Overall	1.4 (0.0, 2.8)		0.7 (0.0, 1.4)	
Hypertension Status				
Normotension	2.6 (0.3, 4.9)	0.17	1.0 (-0.2, 2.2)	0.86
Controlled Hypertension	0.6 (-1.1, 2.)		0.6 (-0.2, 1.5)	
Uncontrolled Hypertension	2.1 (0.0, 4.1)		0.6 (-0.4, 1.7)	
Diabetes				
No	1.6 (0.2, 3.1)	0.38	0.7 (-0.1, 1.4)	0.72
Yes	0.6 (-1.6, 2.8)		0.9 (-0.3, 2.0)	
Sex				
Female	1.4 (-0.1, 3.0)	0.93	0.8 (0.0, 1.6)	0.58
Male	1.3 (-0.5, 3.2)		0.5 (-0.4, 1.5)	
Obesity				
BMI < 30	1.6 (0.2, 3.1)	0.37	0.7 (0.0, 1.5)	0.82
BMI $\geq$ 30	0.7 (-1.4, 2.7)		0.6 (-0.5, 1.7)	
Beta Blockers				
No	1.6 (0.0, 3.1)	0.66	0.6 (-0.3, 1.4)	0.62
Yes	1.1 (-0.6, 2.9)		0.8 (-0.1, 1.7)	
ACE Inhibitors/ARB				
No	1.8 (0.2, 3.3)	0.32	0.7 (-0.1, 1.5)	0.88
Yes	0.8 (-1.0, 2.6)		0.7 (-0.2, 1.7)	
Calcium Channel Blockers				
No	1.8 (0.3, 3.2)	0.07	0.7 (-0.1, 1.4)	0.91
Yes	-0.2 (-2.4, 1.9)		0.6 (-0.5, 1.8)	
Thiazide Diuretics				
No	1.5 (0.0, 3.0)	0.71	0.8 (0.0, 1.6)	0.38
Yes	1.1 (-0.9, 3.1)		0.3 (-0.7, 1.4)	

BMI = body mass index; ACE = angiotensin converting enzyme; ARB = angiotensin receptor blocker.

**Table S5:** Change in supine SBP and DBP associated with an interquartile range increase in mean PM<sub>2.5</sub> levels over the 28 days prior to evaluation.

Participant Subgroup	Change in SBP (95% CI)	P <sub>h</sub>	Change in DBP (95% CI)	P <sub>h</sub>
Overall	0.3 (-1.1, 1.7)		1.0 (0.1, 1.9)	
Hypertension Status				
Normotension	1.9 (-0.2, 4.1)	0.16	1.0 (-0.4, 2.3)	0.63
Controlled Hypertension	0.0 (-1.6, 1.6)		0.8 (-0.2, 1.8)	
Uncontrolled Hypertension	-0.3 (-2.2, 1.6)		1.4 (0.2, 2.6)	
Diabetes				
No	0.1 (-1.3, 1.5)	0.25	0.9 (0.0, 1.8)	0.39
Yes	1.3 (-0.9, 3.4)		1.4 (0.1, 2.8)	
Obesity				
BMI < 30	0.5 (-1.0, 2.0)	0.41	1.1 (0.2, 2.1)	0.41
BMI ≥ 30	-0.2 (-2.1, 1.7)		0.7 (-0.5, 1.9)	
Sex				
Female	0.7 (-0.8, 2.2)	0.18	1.2 (0.3, 2.2)	0.16
Male	-0.5 (-2.2, 1.3)		0.5 (-0.6, 1.6)	
Beta Blockers				
No	1.0 (-0.5, 2.6)	0.06	1.4 (0.5, 2.4)	0.07
Yes	-0.6 (-2.2, 1.1)		0.5 (-0.5, 1.5)	
ACE Inhibitors/ARB				
No	1.0 (-0.5, 2.5)	0.07	1.2 (0.3, 2.2)	0.24
Yes	-0.6 (-2.3, 1.2)		0.6 (-0.5, 1.7)	
Calcium Channel Blockers				
No	0.5 (-0.9, 1.9)	0.42	1.1 (0.2, 2.0)	0.66
Yes	-0.3 (-2.3, 1.7)		0.9 (-0.4, 2.1)	
Thiazide Diuretics				
No	0.5 (-1.0, 2.0)	0.69	1.0 (0.1, 1.9)	0.70
Yes	0.1 (-1.7, 2.0)		1.2 (0.1, 2.3)	