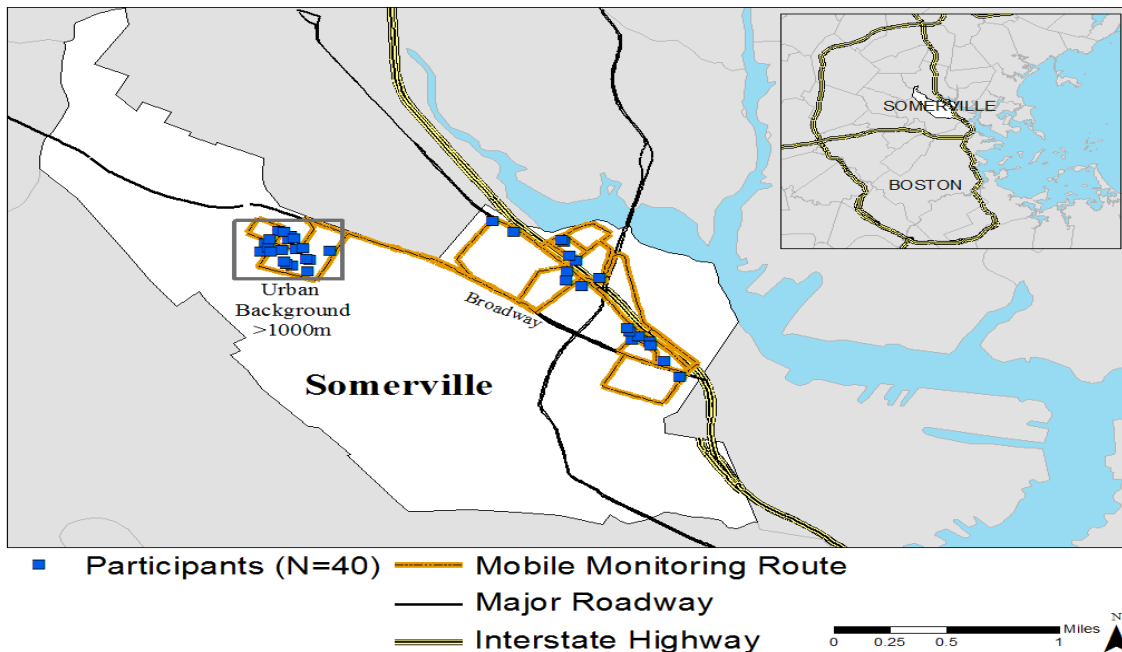




## Research Summary: Pilot Study Suggests a Role for an Inflammatory Molecule Rarely Studied in Air Pollution Research

By: Eda Yiqi Lu



**Figure 1:** Map of Somerville which shows the locations of the 40 participants and their proximity to a major road or highway

**Image by:** Kevin Lane

Living close to a major road or highway is linked to having an increased risk of heart attacks and strokes. This may be due to the ultrafine particles (UFP) in the air, which are particles smaller than 100nm (1/10,000 of a meter) and produced by vehicle emissions. In order to investigate further, this study chose to focus on the presence of cytokines and other biomarkers in the bloodstream of participants.

Cytokines are protein molecules that relay messages between immune systems cells. An increase of cytokines in the bloodstream indicates inflammation that can contribute to cardiovascular disease. There are

many different kinds of cytokines, and this study was particularly interested in a type of cytokines named IL-1 $\beta$ . The cytokine IL-1 $\beta$  plays a key role in inflammatory response.

### How was it done?

Blood samples were taken in order to analyze them for cytokines. A subsample of 40 participants from Somerville, MA was chosen for this analysis. Participants were chosen based on their residential proximity to Interstate 93. Twenty of them lived in the urban background area (>1000m away from the highway and >50m from major roads) and 20 lived near the high-

way (<100m). The near-highway participants and the urban background participants were matched as much as possible on age, gender, and education.

### **What did they find?**

The most interesting finding was that there were differences in IL-1 $\beta$  between the near highway and urban background populations even though the difference was not statistically significant. The participants who live near the highway had higher levels of IL-1 $\beta$  than the participants who live in the urban background area. Another biomarker of inflammation named C-reactive protein (CRP) was also investigated. The difference in C-reactive protein (CRP) values was close to being statistically significant. Participants living near the highway had higher levels. Controlling for income, employment, and health history did not alter these findings much.

### **Why is it important?**

To our knowledge this is the first report to find an association of IL-1 $\beta$  with proximity to highways or heavy traffic. If IL-1 $\beta$  is increased in the body by pollution from the highway, it could affect the risk of developing heart attacks and strokes.

### **Future research**

The researchers who did this analysis are interested in the possibility that IL-1 $\beta$  may be a valuable blood marker to measure in air pollution research.

#### **For more information, contact:**

Doug Brugge, PhD, MS  
Department of Public Health and Community  
Medicine, Tufts University School of Medicine  
136 Harrison Ave., Boston, MA  
E-mail: [dbrugge@aol.com](mailto:dbrugge@aol.com)

#### **This study was funded by:**

- National Institute of Environmental Health Sciences
- EPA STAR Fellowship
- National Center for Research Resources
- National Center for Advancing Translational Sciences
- National Institutes of Health

#### **To learn more about this research, please refer to the following source:**

Brugge D, Lane KJ, Stewart A, Tai AK, Woodin M. 2013. *Highway Proximity Associations with Blood Markers of Inflammation: Evidence for a Role for IL-1 $\beta$* . Journal of Toxicology and Environmental Health. <http://www.tandfonline.com/doi/abs/10.1080/15287394.2013.752325>