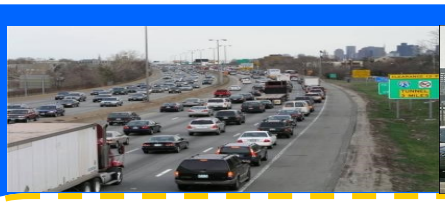
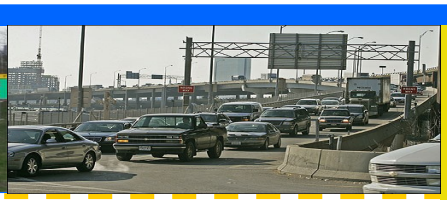




COMMUN
ASSESSME
OF FREEWAY EXPOSURE & HEALTH

CAFEH Study Progress Report

By Sherry Hou

Background

Exhaust from cars is a major air pollutant and can be harmful to human health. Car exhaust usually consists of a variety of different substances, including gases and particles. The particles are categorized according to their sizes. For example, $PM_{2.5}$ are particles less than 2.5 micrometer (one ten thousandth of an inch). The Environmental Protection Agency has set specific standards for the concentration of $PM_{2.5}$.

Another much smaller, less studied type of particles are called "ultra fine particles" (UFP). UFP are extremely small particles less than four millionths of an inch (less than 100 nanometers). Because of their size, UFP can easily enter a person's lungs when breathed in and pass into the blood stream. Scientists suspect that UFP might be harmful to people's hearts and blood system (cardiovascular diseases).

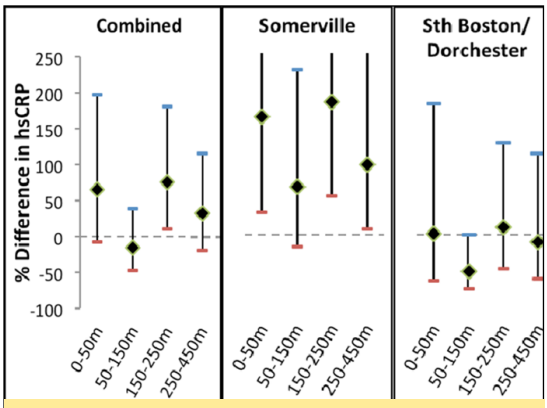
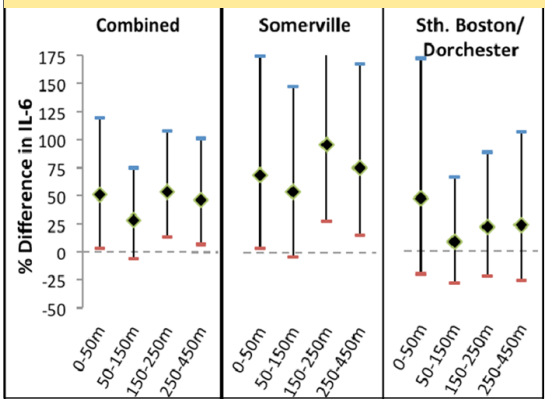


Figure 1&2: Blood levels of hsCRP (upper) and IL-6 (bottom) at different distances from I-93 highway in Somerville and Dorchester.



About CAFEH?

With the help of all participants and community partners, CAFEH successfully recruited about 700 participants in Somerville, Dorchester, South Boston, Chinatown and Malden. Each participant finished a survey questionnaire and answered questions regarding their diet, physical activity, and any other questions that might influence cardiovascular outcomes. About 450 participants also agreed to provide blood samples. Taking their questionnaire responses into account, we compared the levels of the biomarkers found in these participants' blood and the distance they live from I-93.

From September of 2009 till August of 2010, the CAFEH research team used a mobile air quality monitor, converted from a recreational vehicle, to measure the level of UFP in the neighborhoods, where participants lived. According to the participants' answers and the distance between their residences and the I-93 highway, we were able to estimate individual participants' exposure to UFP.

What has the CAFEH study found so far?

After controlling for many other risk factors, we found that the participants who live closer to the highway have higher levels of C-reactive protein and Interleuken-6 in their blood (Figure 1&2). These are markers of inflammation that are associated with greater risk of heart and blood illness. Therefore, higher levels of these markers suggest greater risk of cardiovascular diseases.

When examining the levels of UFP monitored near the highway, we also found that the UFP levels were higher closer to the highway and inside highway tunnels. The concentration of these particles decreased with distance from the highway but was also high near major roadways. Unlike the concentration of ultrafine particles, the levels of larger particles did not vary with distance from the highway. More importantly, we also found that UFP can and do get into people's homes.

What is next for the CAFEH study?

There will be more findings from this study in the coming months. Our most important analysis on whether UFP exposure is associated with blood markers of heart and blood disease risk will be published in the near future.

So far, CAFEH has collected data at only one time for each participant. In other words, it does not capture the development of disease over the course of many years. Compared to a long-term follow-up study, this study cannot provide as much information about the causal relationship between UFP and heart and blood disease risk. Therefore, the CAFEH research team is hoping to convert CAFEH into a follow-up study or a longitudinal study.

How does this affect you?

In the future, staff from the CAFEH study may approach you and ask if you would like to be a part of a longitudinal study. They may ask you if you would be willing to fill out a quick survey. Your participation would greatly contribute to our ability to apply for funding to continue the study. We hope that the science and knowledge from this study will hopefully better inform policy decisions and lead to cleaner air and healthier environment.

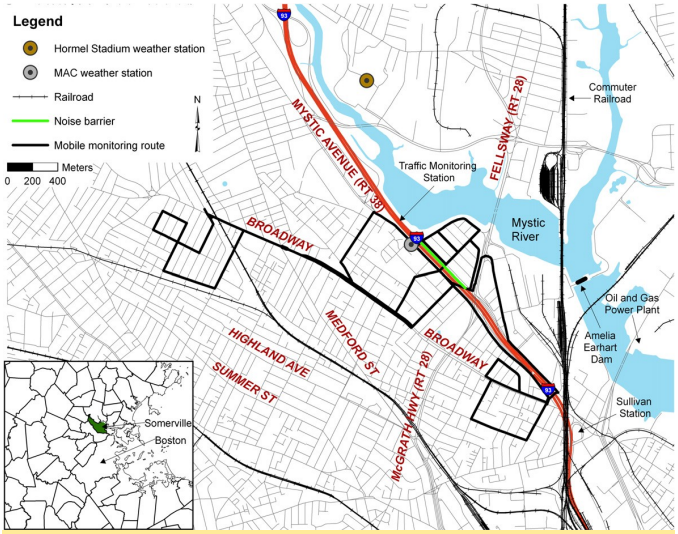


Figure 3: Somerville study area and mobile monitoring route.

Figure 4: The CAFEH research team and the mobile monitor (converted from an RV).

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National Institute of Environmental Health

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

If you would like to find out more about what CAFEH has found thus far, please refer to the CAFEH website: http://sites.tufts.edu/cafeh/progress/. The colored bubbles have easy to read fact sheets about each scientific articles that has been published so far.