# Rush-Hour Commuting: How Pollution Inside the Car Can Affect Health

**Adapted from:** Exposure to traffic pollution, acute inflammation and autonomic response in a panel of car commuters **(2014) and** Modification of Traffic-related Respiratory Response by Asthma Control in a Population of Car Commuters **(2015),**
Conducted by **Dr. Jeremy A. Sarnat, Dr. Maria Mirabelli,** and colleagues. Dr. Sarnat and several co-authors are members of the HERCULES Exposome Research Center.

## Introduction and Purpose

With 10 million Americans spending more than 2 hours commuting each day, it is important to understand the negative health impacts related to traffic pollution. The Atlanta Commuter Exposure (ACE-1) study (conducted between 2009 and 2011) examined pollution inside a car driven during rush hour traffic and the effects this pollution has on the driver's heart and lung health.

This summary looks at two papers that came out of the ACE-1 study. The first paper was about the effects of traffic-related pollution on **respiratory** and **cardiovascular** health among drivers with and without asthma. The second paper looked at how **respiratory** health effects differed when a driver had their asthma under control versus not under control.

## How the Study Was Done (Methods)

21 adults with self-reported asthma and 21 adults without asthma participated in the ACE-1 study. Each person drove two similar pre-planned rush-hour highway commutes. The air pollutants inside the car were measured during each commute using filter samples.

18 adults with asthma completed survey questions about their asthma condition to assess how well their asthma was under control.

**Indicators of cardiovascular and respiratory health** were measured before, during, and after the commute.

## Results of Study

Air pollution inside the car was higher during the 2-hour commute than typical roadside pollution-levels. The 2-hour commute during morning rush-hour traffic was also associated with increased **inflammation** of the lung and reduced **indicators of cardiovascular health**.

**Indicators of respiratory health** were worse among those whose asthma was not well-controlled. Specifically, higher levels of air pollution were associated with a lower ability to force air out after taking in a full breath among participants with lower levels of asthma control. These findings were **statistically significant.**

## Limitations (Why we can't draw stronger conclusions)

All commutes took place in Atlanta, a high-traffic, urban setting. These health effects may differ for commutes in other cities or settings.

## What does this mean?

While it is hard to draw strong conclusions from one study, this study suggests that driving during rush hour traffic can lead to short-term changes in **respiratory** and **cardiovascular indicators**, which may signal reduced health for some people.

Level of asthma control can influence **respiratory** response to pollution inside the car during rush-hour commuting.

## Key Words

**Respiratory:** Relating to the lungs and/or a person's ability to breathe

**Cardiovascular:** Relating to the circulatory system, which is the heart and blood vessels

**Some indicators of respiratory health:**

- **inflammation** (when the lungs are swollen and red)
- exhaled nitric oxide
- ability to force air out after taking in a full breath

**Some indicators of cardiovascular health:**

- heart rate (beats per minute)
- heart rate variability (time in-between heartbeats)
- blood pressure (measure of the pressure of circulating blood)

**Statistically significant:** A statistical term that means there is enough evidence that the results obtained were not only due to chance.

## Tips

If you have asthma and must drive during rush-hour traffic, it is important to make sure your asthma is well-controlled.

If possible, do not drive during rush-hour traffic.

Consider commute alternative to driving solo on the highway, such as taking alternative routes off of the highway or taking the bus or train.

Read the full articles here: http://www.sciencedirect.com/science/article/pii/S001393511400156X (for the 2014 article) and https://www.ncbi.nlm.nih.gov/pubmed/25901844%20 (for the 2015 article)

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