



Traffic exposure, diabetes medications and risk of heart disease and stroke

By: Andrea Stewart

Type 2 diabetes is a condition where sugar builds up in the blood. This happens because the body is unable to produce the insulin it needs to process the sugar. People diagnosed with Type 2 diabetes usually have it for the rest of their lives, and have to take medication to help control their blood sugar. These people also have a higher risk of experiencing heart attacks and strokes than non-diabetics. Researchers at Tufts and Northeastern Universities recently conducted a study that examined the health of people with Type 2 diabetes who live close to major roads.

Living close to traffic exposes people to higher levels of pollution and noise, which can harm health. Past research has shown that people with diabetes are more vulnerable to air pollution than non-diabetics.

While investigating whether individuals in the Boston Puerto Rican Health Study were at an increased risk of heart attack and stroke if they lived closer to major roads, Dr. Christine Rioux and her fellow researchers at Tufts and Northeastern noticed an interesting trend in people with Type 2 diabetes.

When Dr. Rioux and colleagues looked at just people in their study who had diabetes, they noticed the trend they expected was reversed. People with diabetes living closer to major roads had a lower risk of heart attack and stroke than those living further away from major roads. This interesting finding prompted the researchers to focus

on the population of 379 study participants with Type 2 diabetes. They decided to look at the different medications people were taking to control their diabetes. They wanted to determine if diabetes medication affects the relationship between exposure to traffic and risk of heart attack and stroke.

How did they measure risk and exposure? Dr. Rioux and colleagues determined risk of heart attack and stroke by measuring the levels of C-reactive protein found in blood samples from the participants in the study. C-reactive protein (CRP) is found in everyone's blood. When you are sick, CRP levels rise as part of your immune system's response to infection. High CRP is also a warning that someone is at risk of having a heart attack or stroke. CRP is also higher in people with Type 2 diabetes.



Treatment for Type 2 diabetes can include either insulin injections, pills that are swallowed, or both.
Image source: diabetesmine.com

In their study, Dr. Rioux and her colleagues measured traffic exposure by looking at how close people in the study lived to major roads. Researchers determined the distance between participants' home addresses and roads on which more than 20,000 vehicles traveled per day. The researchers proposed that people living closer to these roads with high traffic would experience higher CRP.

What relationships did they look at?

Researchers divided the diabetic study population into two groups: those who used insulin injections to treat their diabetes, and those who used only oral diabetes medication. Oral medications are taken by mouth as pills. These pills help diabetics control their blood sugar by helping the body use the insulin it produces by itself.

When the researchers looked at the relationship between traffic and CRP levels within this population, they found an interesting difference between insulin users and those who were taking only oral medications. Diabetics who used insulin had higher CRP levels if they lived closer to major roads, compared with those insulin users who lived further from traffic. This result confirmed the researchers' idea that people who live closer to traffic will have higher CRP. However, the exact opposite effect was seen in the study participants taking just oral medications. For these people, those who lived closer to traffic actually had significantly *lower* CRP levels than those who lived further from a major road. This means this study found that diabetics who live closer to traffic should have *lower* risk of heart attack or stroke if they are taking only oral diabetes medication.

Why does this happen? We don't know based on this one study, but the researchers suggested that people who need to take insulin may be experiencing insulin resistance. Insulin resistance weakens blood vessels and can lead to atherosclerosis and stroke. Insulin users are at an increased risk of heart attack and stroke, and exposure to traffic may increase this risk. Oral medications, on the other hand, help the body use the insulin it makes by itself. These drugs also suppress genes that lead to inflammation. C-reactive protein is involved in inflammation, so levels of CRP in the blood of oral medication users might be

affected by their medication. The researchers proposed that breathing in inflammation-causing traffic pollution might actually trigger anti-inflammatory processes in the bodies of people taking only oral diabetes medication, which would lead to lower CRP levels.

Why is it important? This is the first study to compare how different diabetes medications influence the human body's reactions to traffic. Puerto Ricans living in the United States have a high rate of Type 2 diabetes, so this study is an important contribution to the knowledge about this particular population.

What can you do? If you have Type 2 diabetes, or are at risk of developing it, make sure to talk to your doctor about how to best control your blood sugar. Your doctor can help you decide on diet, exercise and medication that will reduce your risk of heart attack and stroke.

People who live close to highways or major roads can reduce their exposure to pollution by exercising in areas with less traffic, keeping their windows shut and using filtration systems which clean the air coming in from the outside.

Andrea Stewart is a Undergraduate Intern w/ the Tufts Community Health Program.

For more information, contact:

Christine Rioux
Dept. of Public Health & Community Medicine
Tufts University School of Medicine

This study was funded by:

- The National Institute of Environmental Health Sciences
- The National Institutes on Aging



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

Rioux CL, Tucker K, Brugge D, Gute DM, Mwamburi M. 2011. *Traffic exposure in a population with high prevalence Type 2 diabetes – do medications influence concentrations of C-reactive protein?* Environmental Pollution. doi:10.1016/j.envpol.2010.12.025 <http://www.sciencedirect.com/science/article/pii/S0269749110005919>