

**Environmental Health Fact Sheet**

# Epigenetics and the Environment

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The Community Outreach and Engagement Core (COEC) increases awareness and understanding of environmental health research.

Stakeholder Advisory Board members include:

- Community Health and Social Services Center, Inc.
- Detroit Hispanic Development Corporation
- Detroiters Working for Environmental Justice
- Institute for Population Health
- Green Door Initiative
- Henry Ford Health System
- Eastside Community Network
- Michigan Department of Community Health
- University of Michigan School of Public Health

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## How Does the Environment Affect Our Health?

Our environments influence how healthy we are. Factors that can affect our health include:

- The quality of the air we breathe
- The food available to us in our neighborhoods
- The amount of stress we experience in our lives

How exactly do all of these factors affect our bodies and our health? At least part of the answer has to do with something called **epigenetics**.

## What is Epigenetics?

Epigenetics is the study of the epigenome, which means “above the genome.” The genome is where we have all of our genes (our DNA), which we inherit from our parents. Our genes have information that tells our bodies how to develop and function. However, our genes do not act alone. They need instructions on what to do.

This is where the epigenome comes in. It determines how much genes express themselves. You might think of the epigenome as the volume control dial on a radio. It turns up the volume on some genes so that they are expressed loudly, and turns down the volume on other genes so that they whisper or are not expressed at all. For example, it might turn up or down the volume on a gene for cancer so that we either get sick or stay healthy. Epigenetic changes like these can affect our health throughout our lives. Things we are exposed to in the environment can influence the instructions that the epigenome gives to our genes before we are born, and at different stages of our lives, from birth through old age.

## Current Research

Researchers have learned some very interesting things about epigenetics in the past few years:

- Factors in our environment, such as food, air, and emotional stress, can affect the kinds of instructions that the epigenome gives to our genes.
- Some epigenetic changes that happen to us in our lifetimes can be passed along to our children and grandchildren.
- The epigenome appears to be linked to many health outcomes, including diabetes, cancer, preterm birth, lupus, and asthma.



## Air Pollution, Asthma and Epigenetics

Asthma is a serious problem that can be caused by indoor and outdoor triggers, such as air pollution. Researchers conducted a study in low-income, minority areas of New York City with high asthma rates and high pollution levels from nearby traffic. They found that pregnant women exposed to a lot of air pollution were more likely to have children with asthma, and that many of these children had **changes in their epigenomes**. The researchers think that when children are exposed to air pollution before birth, this may cause epigenetic changes that can lead to asthma as these children grow older. This finding may help to partly explain the high rates of asthma in these communities.



### What Does this Mean for Me and My Community?

While researchers are still exploring which environmental factors lead to epigenetic changes, there is good evidence that chemicals in food, air pollution, and stress play an important role in changing our epigenomes. Here are some steps we can take to address these specific factors:



- Promote access to affordable, healthy foods that are not treated with harmful chemicals
- Support regulations for cleaner air, and ones that make it illegal to locate freeways and industries that produce air pollution near homes and schools
- Report air pollution complaints to the Michigan Department of Environmental Quality District Office by calling 313-456-4700 or 586-753-3700
- Avoid exposure to cigarette smoke and other environmental pollutants whenever possible
- Wear sunscreen whenever traveling outdoors



For additional information, please visit [ehscc.umich.edu](http://ehscc.umich.edu).

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*The University of Michigan Environmental Health Science Core Center promotes collaboration among UM environmental health researchers and communities. Researchers work together to advance knowledge of environmental health issues that affect community members in Detroit and Southeast Michigan.*

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