



Epigenetics, Asthma, and the Environment

The M-LEEaD Center's Community Engagement Core (CEC) increases awareness and understanding of environmental impacts on human health.

Stakeholder Advocacy Board members include:

- Community Health and Social Services
- Detroit Health Department
- Detroit Hispanic Development Corporation
- Detroiters Working for Environmental Justice
- Eastside Community Network
- Ecology Center
- Henry Ford Health System
- Michigan Environmental Justice Coalition
- We the People of Detroit

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How does the Environment Affect Our Health?¹

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? Part of the answer has to do with something called epigenetics.

What is Epigenetics?²

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.³ 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 instructions that the epigenome gives to our genes.^{3 4 5}
- Some epigenetic changes that happen to us in our lifetimes can be passed along to our children and grandchildren.⁷
- The epigenome appears to be linked to many health outcomes, including diabetes, cancer, preterm birth, lupus, and asthma.^{3 6 7 8}





Air Pollution, Asthma, and Epigenetics



Asthma is a serious problem that can be caused by indoor and outdoor triggers, such as air pollution.⁹ Many studies have found that pregnant women exposed to a lot of air pollution were more likely to have children with asthma or other respiratory issues, 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 communities which are exposed to high levels of pollution.^{10 11 12 13 14 15}

What Does this Mean for Me and My Community?

Researchers are continuing to examine the environmental factors linked to epigenetic changes and health outcomes. Even as they do so, there is good evidence that chemicals in food, air pollutants and stress can affect the epigenome and health. Here are some steps we can take to protect our health:

- Promote access to affordable, healthy foods that are not treated with harmful chemicals
- Support regulations for cleaner air, and that prevent the location of freeways and industries next to schools, homes and health care facilities.
- Report air pollution complaints to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) 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.

Please see http://mleead.umich.edu/Coec_Fact_Sheets.php for the citations included in this factsheet.

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