

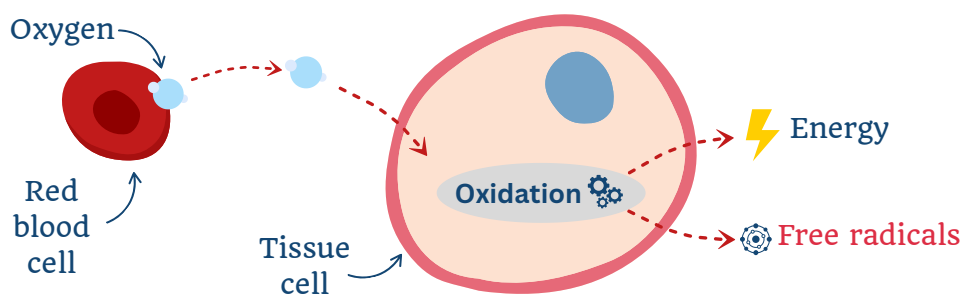


# What is Oxidative Stress?

## The Science and Action Steps for Community Members

### What is oxidation?

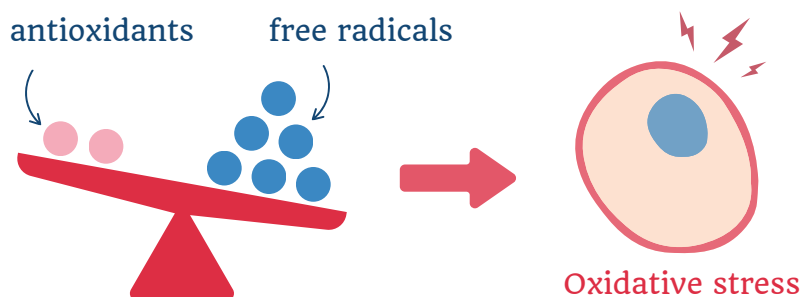
Every time we breathe, about 20% of what we inhale is oxygen. Our lungs pass this oxygen to our red blood cells, which carry it all around our body. Our cells need oxygen to work properly. This process, called oxidation, is essential for life.



As our cells use oxygen, they naturally make tiny molecules called free radicals. Things like air pollution can create even more of free radicals in our body. Free radicals can affect how our cells work and cause damage if there are too many.<sup>1</sup> Thankfully, our bodies have antioxidants that help reduce the amount of free radicals and protect our cells.<sup>2</sup>

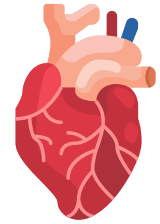
### What is **oxidative stress**?

Oxidative stress happens when there are too many free radicals and not enough antioxidants in our cells.<sup>1</sup> Over time, this can harm our tissues.<sup>2</sup>



## Why is oxidative stress important for my health?

Oxidative stress has been linked to many health problems, like some cancers, heart disease, obesity, diabetes, Alzheimer's, eye diseases, Lupus, and others.<sup>1 2</sup> Eating foods high in antioxidants can help by blocking harmful free radicals and lowering their effects on the body. (see page 4).<sup>3 4 5</sup>



## How is what we breathe linked to oxidative stress?

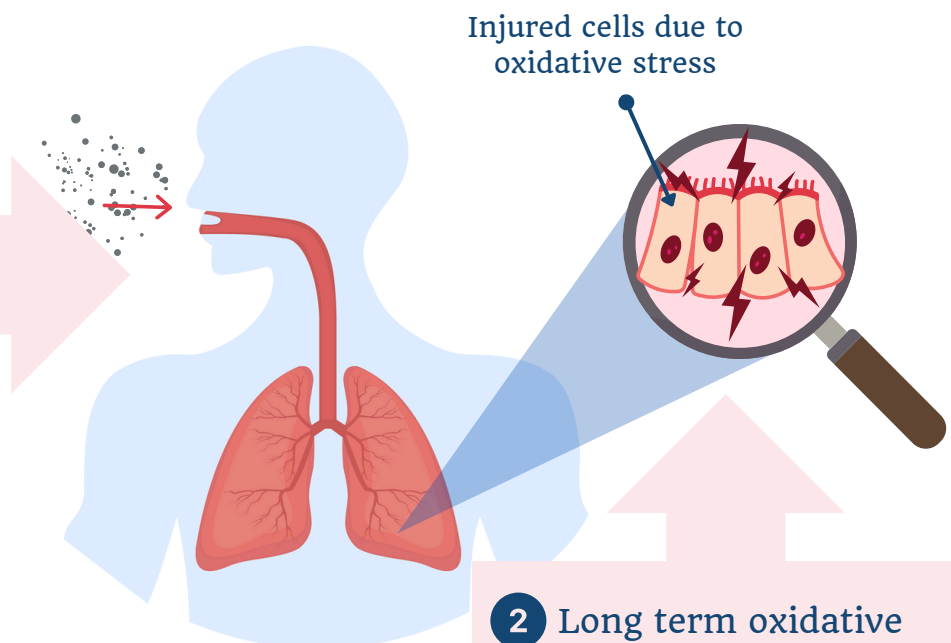


What we breathe can increase the amount of free radicals in our body, which affects our health. For example, one of the reasons why smoking causes negative health impacts is because of oxidative stress. When people inhale smoke, it creates free radicals that damage health.<sup>2 6</sup>

**Air pollution** from transportation and industrial sources (such as particulate matter, ozone, and nitrogen oxides) is linked to many diseases such as asthma, diabetes, heart disease, lung disease, cancer, and negative effects on the brain and the nervous system. Oxidative stress may be one of the factors that explains the relationship between air pollution and these health outcomes.

Researchers think that air pollution can affect health through the following path:

**1** The air pollution particles we breathe in increase the amount of free radicals in lung cells, heart cells, and other cells in the body. This increases oxidative stress in our tissues.



**2** Long term oxidative stress can damage and injure cells and tissues throughout the body. This can lead to disease.



## How can social pressures affect health through oxidative stress?

Scientists are learning that long-term stress from hard life situations—like not having enough money, food, or safe housing, or facing unfair treatment—can affect the body. These kinds of stress can lead to oxidative stress, which may raise the risk for health problems over time. It can be even worse when people don't have easy access to healthy foods like fruits and vegetables, which help protect the body. This may help explain why some communities have higher rates of illness than others.

## Why does oxidative stress affect people differently?

Oxidative stress exposures do not affect health in the same way. They depend on many factors such as:



**How much?** Bigger or more regular exposures to factors like air pollution are connected to more oxidative stress in the body. The intensity and frequency of oxidative stress can affect the severity of related health issues.



**How long?** Longer exposure to social and environmental stressors is associated with higher oxidative stress. Environmental and social stressors can also add up over time, which can increase the risk of developing disease.

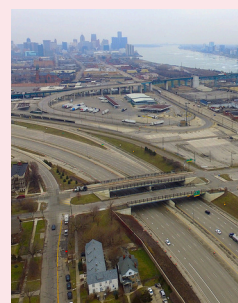


**What age?** Younger and older individuals are more at risk of oxidative stress because they have a reduced ability to produce antioxidants and reduce oxidative stress.

## Why is oxidative stress important in cities like Detroit?

Many Detroit residents face multiple, combined and ongoing exposures to social and environmental stressors, which can increase their risk of oxidative stress and health issues over time. These stressors include:

- Air pollution from over 60 industrial sources and emissions from transportation
- Long-term lack of investment in the city and unfair treatment of residents, which have added to daily stress and made it harder for people to access healthy, nutrient-rich foods like fruits and vegetables
- A large population of young and elderly individuals in this area, making this community especially vulnerable.





## What does this mean for me?

If you live, work or attend school in a place with high levels of outdoor or indoor air pollutants, or if you have high levels of stress in your life, you may be at a higher risk of oxidative stress. Here are some actions you can take to lower your risk:

- Eat more antioxidant-rich foods such as nuts, berries, and dark green leafy vegetables
- Exercise regularly
- Reduce your exposure to air pollution

## What are effective ways to protect myself from air pollution?

Check the air quality index (AQI) here: [airnow.gov](https://airnow.gov). Remember these main points: when the AQI is **high (151 or higher)**, take action! (If you are pregnant or have health issues, you might take these actions when the AQI is at even lower levels like **51 or higher**):

### When indoors:

- Keep doors and windows shut
- Use an air purifier, change air filters as needed
- Depending on the season: turn on your furnace or turn on your air conditioner, if you have one

### When outdoors:

- Use an N95 face mask

Learn more ways to protect you and your community:



Scan this QR code or go to:  
<https://linktr.ee/airpollutionresources>



## How can I support my community?

Policies play an important role in making sure everyone has lower levels of oxidative stress. You can:

- Encourage **regulations that lower exposure to air pollutants** from cars and trucks or from industrial sources.
- Support **regulations that improve indoor air quality**, such as smoking bans in public places and indoor air filtration systems in schools and workplaces.
- Establish **more culturally appropriate grocery stores with fresh food** within a reasonable distance in all Detroit neighborhoods.



Please see [http://mleead.umich.edu/Coec\\_Fact\\_Sheets.php](http://mleead.umich.edu/Coec_Fact_Sheets.php) for the citations included in this factsheet. This research was supported by the National Institute of Environmental Health Sciences (NIEHS) (#R01ES022616, #R01ES032389) and the Fred A. and Barbara M. Erb Family Foundation, with additional support provided by the Michigan Center on Lifestage Environmental Exposures and Disease (M-LEEaD) (NIEHS #P30ES017885).