

LAY ABSTRACT

TITLE: Diverse mechanisms by which chemical pollutant exposure alters gut microbiota metabolism and inflammation

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The gut is home to tiny microbes like bacteria, viruses, and fungi. Gut microbes help you digest food and break down chemicals that enter your body. Some of these chemicals come from pollution in the air, food, or water. Being exposed to pollution, especially over time, can harm gut health. This can make it harder for the body to absorb nutrients and remove harmful substances.

The researchers in this study looked at many other studies on pollution and how it affects our gut microbes, gut health, and health outcomes.

The studies the researchers found explained the many ways that pollution changes gut microbes. These studies explained that when your gut is unhealthy, this can cause swelling, or inflammation, in the body. Inflammation is linked to serious health problems like heart disease, cancer, and mental illness.

Pollutants such as heavy metals, persistent organic pollutants (POPs), and nitrates can change your gut microbes. Some gut microbes can even make these chemicals more toxic inside your body. Pollutants may also cause unhelpful gut microbes to grow and remove the microbes that keep our gut healthy. This can damage your gut lining and change how your gut digests food or absorbs nutrients. For example, metals like lead or

arsenic can change which bacteria live in your gut. Exposures to these metals can cause gut inflammation by decreasing good bacteria that helps to maintain gut health.

Other chemicals can change how your gut signals or “talks to” the rest of your body. Scientists are still learning how pollution and gut health are connected. A lot of what we know about chemicals and the gut is based on animal studies, which do not always translate directly to the human gut microbiome. Future research on the gut microbiome should explore bacteria that is shared between many animals and humans, and performs a similar function. Also, more studies should explore the gut microbiome over a long period of time in a large group of people. That way, we can begin to understand more about the timing of exposure to pollutants and how it may relate to our gut health.