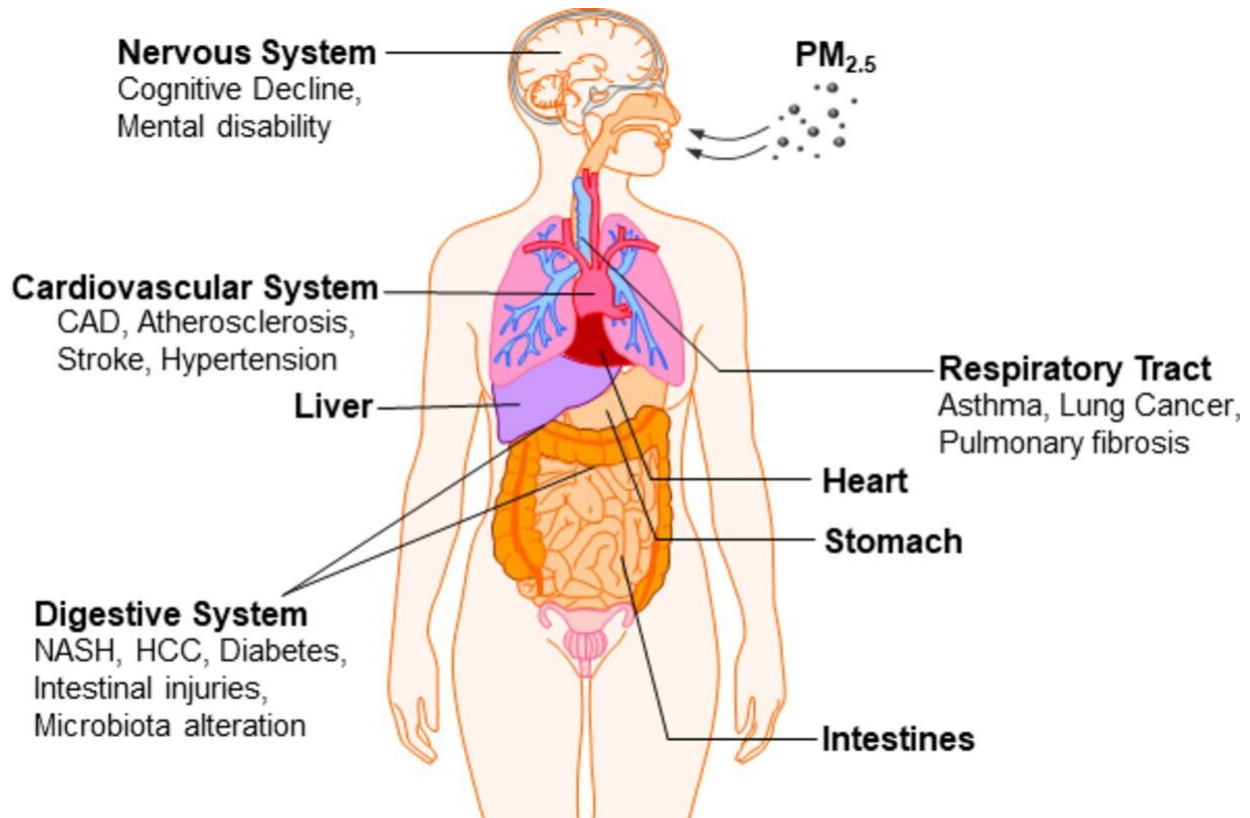


How air pollution affects the digestive system

May 24 2024



The diseases caused by $PM_{2.5}$ pollution in different systems are shown. CAD, cardiovascular disease; NASH, non-alcoholic steatohepatitis; HCC, hepatocellular carcinoma. Credit: Kezhong Zhang

Fine air particles, less than 2.5 micrometers in diameter ($PM_{2.5}$), are a major air pollutant linked to various health problems. These particles can travel deep into the lungs and even enter the bloodstream when inhaled.

Recent research suggests a major health concern: PM_{2.5} exposure can also damage the digestive system, including the liver, pancreas, and intestines.

The work is [published](#) in the journal *eGastroenterology*.

This recent research has been focused on how PM_{2.5} exposure triggers stress responses within the digestive system's cells. These stress responses involve specialized subcellular structures within cells called organelles, such as the [endoplasmic reticulum](#) (ER), mitochondria, and lysosomes. When PM_{2.5} disrupts these organelles, it creates a [chain reaction](#) within the cells that can lead to inflammation and other [harmful effects](#).

The liver, a major organ for detoxification and metabolism, is particularly susceptible to PM_{2.5} damage. Studies have shown that PM_{2.5} exposure can lead to a cascade of problems within the liver, including inflammation, stress responses, and damage to the organelles, and disrupted energy metabolism. These effects can contribute to the development of non-alcoholic fatty liver disease (NASH) and type 2 diabetes.

PM_{2.5} exposure does not stop at the liver. It can also harm the pancreas and intestines. Studies have linked PM_{2.5} to an increased risk of pancreatic impairment in people with diabetes, as well as damage to intestinal cells and an increase in their permeability. This increased permeability can lead to a variety of digestive issues.

While the recent research efforts provide valuable insights, key questions remain. Scientists are still working to understand how cells sense PM_{2.5} and how the [stress response](#) differs in various digestive organs. Additionally, they are investigating how PM_{2.5} exposure affects communication between different digestive organs, potentially impacting

overall digestive function.

Finally, researchers are exploring whether dietary or pharmaceutical interventions can mitigate PM_{2.5} damage. Interestingly, some studies suggest that certain nutrients, like [monounsaturated fatty acids](#) and vitamins, may offer some protection against the harmful effects of PM_{2.5}.

Air pollution is a complex issue with no easy solutions. While research continues mitigating PM_{2.5} exposure, the current understanding of its impact on the [digestive system](#) highlights the far-reaching consequences of air pollution on human health. It underscores the need for continued efforts to reduce [air pollution](#) levels and develop strategies to protect ourselves from its detrimental effects.

More information: Kezhong Zhang, Environmental PM_{2.5}-triggered stress responses in digestive diseases, *eGastroenterology* (2024). [DOI: 10.1136/egastro-2024-100063](#)

Provided by First Hospital of Jilin University

Citation: How air pollution affects the digestive system (2024, May 24) retrieved 26 May 2024 from <https://medicalxpress.com/news/2024-05-air-pollution-affects-digestive.html>

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