

LAY ABSTRACT

TITLE: Environmental chemical-wide associations with immune biomarkers in US adults: a cross-sectional analysis

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Scientists want to know how chemicals in the environment change our bodies. This study looked at data from a US health survey between 1999 and 2018.

Researchers looked at 196 chemicals in people's blood and urine. They also looked at parts of the immune system, like white and red blood cells. The researchers wanted to find any connections between the chemicals and the immune system.

The study included 45,528 adults, with an average age of 46 years. About half were women, and most were Non-Hispanic White. They found 71 chemicals were linked to one or more changes in the immune system. The strongest connections were found with the count and size of red blood cells. Red blood cells contain hemoglobin, which is a substance that helps carry oxygen throughout our bodies. How much oxygen is delivered to our tissues depends on how well our red blood cells work and how much we have. When red blood cells are low in our body, this can be a sign of low levels of iron, vitamins or a medical condition. When red blood cells are high, this causes blood to be thicker than normal and can also be a sign of disorder or disease. The shape and size of our red blood cells impacts how well they can give our body oxygen. Too big and the red blood cells may not last as long or they may break more easily. Too small and the red blood cells may not be able to transport as much oxygen. In this study, when levels of cotinine (a chemical from smoking) doubled, the red blood cells got bigger. When levels of lead doubled, there were more red blood cells. Metals and smoking-related chemicals had the most effects on blood cells.

This study shows chemicals that might harm the immune system. Scientists can study these chemicals more to understand how they affect health.