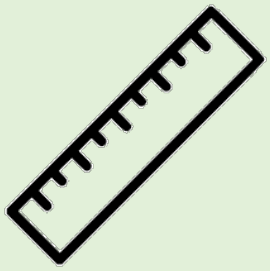
Bioavailability 101: Lead in Soil

Developed by the EPA Superfund Technical Review Workgroup

What is soil lead bioavailability?

Lead poisoning happens when too much lead gets into the blood. This process is called absorption, which is when lead moves from the environment into the body. People can get lead from different sources, like air, water, food, and dust. In places where the soil has a lot of lead, children may get lead by touching the soil and then putting their hands in their mouth or on their face. Not all the lead in the soil is absorbed by the body. The part that is absorbed is called the "bioavailable" lead. If bioavailability is 0%, none of the lead is absorbed. If it's 100%, all of the lead is absorbed. Scientists can test the bioavailability of lead in soil in a lab.

Why measure soil lead bioavailability?



Measuring how much lead in soil can be absorbed by the body helps figure out if action is needed to prevent lead poisoning. To decide if action is needed scientists compare the amount of lead in the soil to a certain "action level." The action level is the amount of lead in the soil that could cause harmful effects. A higher risk of poisoning requires a lower action level to prevent lead poisoning. If the lead in the soil is not easily absorbed, the action level will be higher, because less lead will enter the body. If the lead in the soil is easily absorbed, the action level will be lower, because more lead will enter the body.

For example, if the action level for lead that is 30% bioavailable is 200 parts per million (ppm), the action level for lead that is 15% bioavailable would be 400 ppm.

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How is soil lead bioavailability measured?

Scientists measure the bioavailability of lead in soil compared to a standard lead form that dissolves easily in water. This is called "relative bioavailability." Relative bioavailability can be tested in lab animals or by testing soil in test tubes. Tests that don't use animals are usually better because they are faster and cheaper, so more soils can be tested in places where people might be exposed to lead. Testing more soils helps us understand if the bioavailability of lead changes in different areas. This could happen if the soil has different types of lead from different sources.

The test the EPA uses to measure soil lead bioavailability is called the IVBA test (Method 1340). The EPA also has a method that uses animals to measure soil lead bioavailability.

Where can I obtain more information on soil lead RBA?

Additional information and assistance on soil lead bioavailability can be found on the EPA Office of Superfund Remediation and Technology Innovation bioavailability webpages: https://www.epa.gov/superfund/soil-bioavailability-superfund-sites, or by emailing the EPA Superfund Technical Review Workgroup Bioavailability Committee hotline (bahelp@epa.gov).