Agency for Toxic Substances and Disease Registry

ATSDR

CADMIUM, ARSENIC and LEAD

EXPOSURE INVESTIGATION
in Herculaneum, MO

What is an exposure investigation?

During an exposure investigation, ATSDR/MDHSS tests the environment, people, and gathers other information to see:

- if there is contamination that people can come in contact with;
- if the contamination is in people; and
- if it is a public health problem.

Why did ATSDR/MDHSS do an exposure investigation?

In November 2002, ATSDR and MDHSS reviewed information on the air and soil/dust testing of arsenic and cadmium in Herculaneum.

Cadmium in people

We concluded that the most recent cadmium air, dust and soil testing does not pose a health hazard to people in Herculaneum. However, we did not know if past levels of cadmium in the air/dust/soil could be a health problem. We can test a person's urine and find out how much cadmium a person has been exposed to from the past.

Cadmium builds up in the body with time. It mostly builds up in the kidney. In the summer of 2003 , we tested for cadmium in urine to find out how much cadmium a person has in their body from the past. Everyone has some cadmium in his or her body, usually from cigarette smoke and some foods.

Arsenic in people

We concluded that the most recent air, dust and soil testing for arsenic does not pose a health hazard to people in Herculaneum. However, some people were still concerned about the arsenic exposure. Because we do not think that the current arsenic levels in the environment are a health hazard, we offered this testing as a service to ease concerns about arsenic.

A person was tested for arsenic in the urine three separate times in June, July and August, 2003. Urine arsenic testing can only tell us about exposure to arsenic for the past few days. By repeating urine arsenic tests three different times over a few months, a person will get a better understanding of their exposure to arsenic over a longer time period. We cannot tell people about arsenic exposure from the past few months or years. This is because urine tests only measure arsenic exposure in the past few days. There is no good test available that can look for past arsenic exposure over months or years.

Fruits and vegetables for cadmium, arsenic and lead

Testing of cadmium, arsenic, and lead in the soil, air, and dust has been done in Herculaneum. Some people in Herculaneum wanted to know if home-grown vegetables are safe to eat if these metals (cadmium, arsenic, and lead) are in the environment. In the summer of 2003, we tested for these metals in home-grown vegetables to find out if they are safe to eat and also tell people about ways to reduce their exposure to these metals from home-grown vegetables.

Who participated?

People had cadmium and arsenic tested in their urine if they:

- Were 10 years of age or older
- Lived within ½ mile of the smelter
- Had no history of current or past occupational exposure to cadmium or arsenic
- Lived in a non-remediated home (yard and interior of home)
- Met more specific eligibility criteria

People had home-grown vegetables tested for cadmium, arsenic, and lead if they:

- Lived within ½ mile of the smelter
- Could provide home grown vegetables

How many people were tested?

Cadmium urine testing: 30 people tested one time

Arsenic urine testing: 30 people tested 3 separate times

How many and what kind of fruits and vegetables were tested?

Fifteen home-grown fruits and vegetables were tested. The following types of fruits and vegetables were tested: apples, cucumbers, green onions, green peppers, lettuce, onions, polk wild greens, potatoes, tomatoes, turnips, and zucchini.

What were the findings of the investigation?

1. Cadmium concentrations in urine samples from participants were not at levels that are associated with adverse health effects. Therefore, the measured exposures to cadmium pose no apparent public health hazard.

2. Arsenic concentrations in urine samples from participants were not at levels that are associated with adverse health effects. Therefore, the measured exposures to arsenic pose no apparent public health hazard.

3. Home-grown fruits and vegetables were tested for arsenic, cadmium and lead. Arsenic concentrations in vegetables are not likely to pose a health risk. Cadmium concentrations are not likely to pose a health risk if consumed occasionally for a few months each year.

4. Lead concentrations in vegetables are not likely to pose a health risk if consumed occasionally, for a few times a week when in season. Children and pregnant women should avoid consumption of home-grown green, leafy vegetables like lettuce and spinach.

5. These conclusions do not apply to arsenic and lead exposures that occurred in the past or to other residents in the area.

What were the recommendations from these findings?

1. ATSDR recommends that general food safety guidelines should be followed by washing hands and foods before consumption. Additional general food safety guidelines are outlined below for home-grown fruit and vegetable consumption to reduce potential exposure to metals.

- Wash all fruits and vegetables to remove soil.
- Peel root crops like potatoes, carrots, beets, etc.
- Discard older or outer leaves of leafy vegetables during food preparation
- Do not compost unused plant parts, peelings, parings for later use in the garden.

2. ATSDR recommends the following prudent protective land use practices to decrease future exposure to metals from gardening in Herculaneum, MO.

- Do not use arsenic-treated lumber to construct raised beds.
- Locate fruit and garden vegetables away from buildings, especially if peeling paint is evident.
- Avoid planting edible plants in soil with highly contaminated metal levels.

3. To minimize absorption of lead by plants, a number of control measures may be taken:
- Maintain soil pH levels close to 7. Lead is relatively unavailable with a soil pH at this level.
- Lime the soil as recommended by your soil test to increase the pH of the soil.

4. Green leafy vegetables tend to accumulate lead on the plant surface and thus tend to have higher lead levels. Therefore, home gardeners should preferentially plant fruiting vegetables instead of green, leafy vegetables. Fruiting vegetables may include some of the following: corn, beans, squash, tomatoes, peppers, cucumbers, peas, apples etc.

Where can I get a copy of the ATSDR/MDHSS report?

A copy of the report will be ready in the near future. When the report is ready, it will be available at City Hall and on the MDHSS website: www.dhss.state.mo.us/ehcdp/Rpt-facts-consults.htm. Or you can call 1-888-422-ATSDR and ask for a copy of the Herculaneum Exposure Investigation on cadmium, arsenic and lead written in 2004.

For more information about the exposure investigation:
ATSDR: Please call toll-free: 1-888-422-ATSDR, ask for Dr. Ketna Mistry.
MDHSS: Please call toll-free: 1-866-628-9891, ask for Ms. Lori Harris-Franklin.