Community Presentation in Pueblo, Colorado

Lead and Arsenic Exposure Near the Former Colorado Smelter in Pueblo, Colorado

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Agency for Toxic Substances and Disease Registry (ATSDR)

What is ATSDR?

- A federal health agency
- Based in Atlanta, Georgia
- Charged with
  - Finding environmental health hazards in communities
  - Preventing exposures to harmful substances
  - Educating communities to increase the knowledge about the health effects from chemical and radiation exposure.
Colorado Smelter Exposure Investigation (EI)

- The soil near the former Colorado smelter and the soil in the slag pile are contaminated with lead and arsenic.

- Community members living within half a mile of the former smelter are at increased risk for exposure to lead and arsenic.

- No previous blood lead testing and urinary arsenic testing took place near the former Colorado smelter.
Slag Pile
Partially unrestricted access and evidence of children riding bikes
Why is ATSDR involved?

- The Pueblo City County Health Department (PCCHD) asked ATSDR to test community members living near the former smelter for lead and arsenic.

- ATSDR collected blood to test for lead and urine to test for arsenic.

- Your child/children may have been exposed to enough lead to cause harm to their health.
Outline

- What is exposure?
- Why are children more likely to be exposed?

Lead
- Sources of exposure
- Health effects from low level lead exposure
- Why prevent lead exposure?

Arsenic
- Sources of exposure
- Health effects
- Why prevent arsenic exposure?

Colorado Smelter Exposure Investigation
What is exposure?

- Exposure is contact with a substance in the environment—in soil or dust, water, or air.

- You can be exposed to a substance by
  - swallowing it
  - breathing it
  - getting it on your skin
  - getting it in your eyes
Why are children at higher risk for environmental exposure to harmful substances?

- They put everything in their mouths
- Their bodies are smaller
- They breathe faster
- They crawl and creep on carpets and floors
- Their bodies absorb more lead when exposed

Lead
# Sources for Lead Exposure

<table>
<thead>
<tr>
<th>Environmental sources</th>
<th>Prevention strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year house built &lt;1978 (lead-based paint)</td>
<td>Identify/Evaluate/Remediate</td>
</tr>
<tr>
<td>Dust from paint chips</td>
<td>Control sources</td>
</tr>
<tr>
<td>Soil contaminated with lead</td>
<td>Restrict play area/cover source</td>
</tr>
<tr>
<td>Drinking water</td>
<td>Check information from water department</td>
</tr>
<tr>
<td>Old plumbing (lead solder)</td>
<td>Check for lead solder</td>
</tr>
<tr>
<td>Home renovation</td>
<td>Proper containment</td>
</tr>
<tr>
<td>Worker take-home contamination</td>
<td>Shower/Remove shoes and clothes</td>
</tr>
<tr>
<td>Some hobbies</td>
<td>Proper use/storage/ventilation</td>
</tr>
<tr>
<td>Some imported toys, cosmetics/spices and ceramic cookware</td>
<td>Avoid use</td>
</tr>
</tbody>
</table>
How can I prevent exposure to lead from contaminated soil?

• Avoid direct contact with the soil; cover the soil with grass/mulch.

• Supervise your children’s play to prevent eating contaminated soil from hand-to-mouth behavior and pica.

• Wash children’s hands, face, pacifiers & drinking bottles regularly.
How can I prevent contaminated soil from being tracked into the house?

• Clean pets’ paws before letting them in the house and bathe pets regularly.
• Take shoes off and leave them at the entryway.
How can I prevent exposure to lead from lead-based paint chips and dust in houses built before 1978?

- Ask the local health department to do a healthy home inspection to find out if your house-paint has lead.
- If lead is found in the paint the health department will show you how to minimize exposure.
How can I prevent exposure to lead from renovations of homes built before 1978 with lead-based paint?

- Ask your local health department
- Control leaded dust
How can I prevent my children exposure to lead from contaminated imported toys from China?

Test imported toys for lead content.
How can I prevent my family exposure to lead from imported ceramic cookware?
Test imported ceramic cookware for lead content.
How can I prevent my family’s exposure to lead from imported colorful food spices?

Avoid use of any imported spices.
How can I prevent exposure to lead from hobbies such as making leaded crystal?

- Use and store materials properly
- Wear appropriate protective clothing
- Ventilate the work area
# Risk Factors That Increase Lead Exposure

<table>
<thead>
<tr>
<th>Age</th>
<th>Infants, and children 1 – 5 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Males younger than 6 years of age</td>
</tr>
<tr>
<td>Pica behavior</td>
<td>Eating non-food items such as contaminated soil, paint chips, lead dust</td>
</tr>
<tr>
<td>Diets without Calcium</td>
<td>Children that are malnourished</td>
</tr>
<tr>
<td>Vitamin C and E</td>
<td></td>
</tr>
<tr>
<td>Low income families</td>
<td>Less access to nutritional food sources</td>
</tr>
</tbody>
</table>
| Cultural practices   | - Wearing eye make-up containing high levels of lead  
                        | - Using food spices sold by street vendors or specialty shops abroad and in U.S.  
                        | - Serving food in lead containing Mexican pottery |
Health Effects in Unborn Babies and Children from Low Level Lead Exposure
How does low level lead exposure harm health?

Even blood lead levels* under 5 micrograms per deciliter** can cause harmful health effects in:

- unborn babies (fetus)
- young children
- adults (including pregnant women)

* Blood lead level=Amount of lead in blood
** Blood lead level under 5 micrograms per deciliter is like dissolving less than one grain of salt in 4 ounces of water.
How does low-level lead exposure in pregnant women harm the health of unborn babies?

<table>
<thead>
<tr>
<th>Blood lead level in pregnant women</th>
<th>Unborn baby</th>
<th>There is evidence of</th>
</tr>
</thead>
</table>
| Even less than 5 micrograms per deciliter | • Affects growth and development | • Small fetus  
• Delivery of a small baby |

National Toxicology Program (NTP), 2012
How does low-level lead exposure harm children’s health?

<table>
<thead>
<tr>
<th>BLLs in Children</th>
<th>Effects in children’s</th>
<th>There is evidence of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 10 micrograms per deciliter, and even at levels below 5 micrograms per deciliter</td>
<td>• Brain</td>
<td>• Poor school performance</td>
</tr>
<tr>
<td></td>
<td>• Sexual Organs</td>
<td>• Lower IQ (Intelligence Quotient)</td>
</tr>
<tr>
<td></td>
<td>• Growth</td>
<td>• Attention problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Behavior problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sexual organs take longer to develop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduce general growth</td>
</tr>
</tbody>
</table>
How does low-level lead exposure harm adults health (including pregnant women)?

<table>
<thead>
<tr>
<th>Blood Lead Level</th>
<th>Health effects</th>
<th>There is evidence of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 10 micrograms per deciliter, and even at levels below 5 micrograms per deciliter</td>
<td>• Kidneys</td>
<td>• Kidneys working slowly</td>
</tr>
<tr>
<td></td>
<td>• Heart &amp; blood vessels</td>
<td>• Higher risk for high blood pressure</td>
</tr>
<tr>
<td></td>
<td>• Brain</td>
<td>• Tremors</td>
</tr>
</tbody>
</table>

Resource: National Toxicology Program (NTP), 2012.
Prevention
When to Test for Lead?

- Take your child to be tested for lead if
  - Your child lives in a high risk area
  - Your child is younger than 6 years of age
  - Your child’s last blood lead level was above 5 µg/dL
  - Your child eats dirt (has pica)
  - Another child in the house has increased blood lead level
  - The house where your child lives or visits frequently (grandparents, caretakers) was built before 1978

- Pregnant women should discuss their risk factors for lead exposure with their doctor.
What affects lead uptake?

The body’s uptake of lead

- Decreases with intake of
  - Calcium (milk, cheese, yogurt)
  - Vitamin B2 (cheese, almonds and beef)
  - Vitamin C and (leafy veggies, peppers, OJ)
  - Vitamin E (spinach, nuts, sunflower seeds)

- Increases with
  - Poor nutrition
  - Diet high in fat
Arsenic
Arsenic

Forms of arsenic

- **Organic**
  - Non-toxic
  - Found mainly in fish and seafood

- **Inorganic**
  - Very toxic, can cause cancer
  - Affects heart and blood vessels
  - Found mainly in ground water and some food products, such as apple juice and rice (especially brown rice)
Sources of Exposure
### How can I be exposed to arsenic?

<table>
<thead>
<tr>
<th>Environmental sources</th>
<th>How to prevent exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil contaminated by industrial activities such as a former smelter</td>
<td>• Avoid direct contact with the soil; cover the soil with grass/mulch.</td>
</tr>
<tr>
<td></td>
<td>• Regularly wash your/your children’s hands and children’s toys, pacifiers, bottles.</td>
</tr>
<tr>
<td></td>
<td>• Do not eat outside in areas where soil is contaminated.</td>
</tr>
<tr>
<td>Foods such as rice (especially brown rice), and apple juice</td>
<td>• All people (including pregnant women) should eat a well balanced diet for good nutrition and to minimize potential adverse effects from consuming an excess of any one food.</td>
</tr>
</tbody>
</table>
Health Effects
**How can arsenic harm my health?**

<table>
<thead>
<tr>
<th>Non-Cancer Health effects</th>
<th>Prevention of exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Nausea</td>
<td>• Avoid ingestion of arsenic contaminated soil</td>
</tr>
<tr>
<td>• Vomiting</td>
<td></td>
</tr>
<tr>
<td>• Changes in skin color</td>
<td></td>
</tr>
<tr>
<td>(arsenic exposure causes dark spots)</td>
<td></td>
</tr>
</tbody>
</table>

## How can arsenic harm my health?

<table>
<thead>
<tr>
<th>Cancer Health Effects</th>
<th>Prevention of exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lung</td>
<td>• Avoid inhalation and avoid ingestion of arsenic contaminated soil and dust</td>
</tr>
<tr>
<td>• Skin</td>
<td>• Avoid ingestion of arsenic contaminated water</td>
</tr>
<tr>
<td>• Bladder</td>
<td></td>
</tr>
</tbody>
</table>
Prevention
How can I prevent arsenic exposure?

In general

- Don’t let your children play in bare soil.
- Don’t let your children eat soil (pica).
- Don’t let your children put dirt-covered objects (like toys) in their mouths.

Regularly

- Wash your children’s hands and toys (especially after playing outside).
- Wash pacifiers and drinking bottles.
- Damp-mop floors and damp-wipe window sills.

Feed your children nutritious foods rich in folate, such as

- Black-eyed peas, chick peas, green peas, black beans, lentils, spinach, collard greens, lettuce, avocado and beets
Colorado Smelter
Exposure investigation (EI)

Field work: September – November 2013
Who was tested for lead and arsenic?

People living within ½-mile of the former smelter and belonging to one of the following groups:

- Children from 9 months to less than 6 years (blood lead testing only)
- Children from 6 to 16 years (blood lead and urinary arsenic testing)
- Pregnant women and women of childbearing age (blood lead and urinary arsenic testing)
What are the target blood lead levels for children under 6 years and pregnant women?

- The level of lead in blood should be less than 5 micrograms per deciliter.
- No safe blood lead level for children and pregnant women has been identified.
What did ATSDR find about lead exposure?

- 135 people were tested for lead.
- Some children living within ½ mile from the former smelter had blood lead levels high enough to harm their health.
- Some of the blood lead levels found are higher than levels found in children in other parts of the country.
- The pregnant woman tested did not have elevated lead level in her blood that will put her at greater risk for harm.
What did ATSDR find out about arsenic exposure?

- ATSDR tested 99 participants in September 2013 and 65 participants in November 2013.
- Participants lived within half a mile of the former Colorado Smelter.
- ATSDR did not find elevated arsenic in participants’ urine.
ATSDR Recommendations

• Prevent exposure to contaminated soil outside – cover the soil with mulch or grass.
• Prevent exposure to contaminated soil in the home – remove shoes, damp mopping.
• Take additional measures to protect children 1 to less than 6 years – separate children from sources of exposure.
• Educate area health care professionals on how to prevent soil lead and arsenic exposures.
1. Continue testing blood lead levels in children under 6 years, pregnant women and women of childbearing age.

2. Characterize the nature and extent of lead and arsenic soil contamination in Pueblo.

3. Stop or reduce people’s exposure to mining wastes in residential soil and slag pile.

5. Develop an environmental health education program for the area.

6. Keep area doctors informed about the health education efforts of the site.
1. PCCHD was awarded an EPA grant for 5 years to help the community of Pueblo by:
   - Conducting health education
   - Conducting blood lead level testing
   - Coordinating the evaluation of children affected by lead exposure

2. In 2014, EPA listed the Colorado Smelter site on the National Priority “Superfund“ list for clean-up.

3. ATSDR published its EI report and is holding public meetings in the community.
Thank you!

Any questions?

For more information please contact Agency for Toxic Substances and Disease Registry

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