State of Alaska Epidemiology **Bulletin**

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Cottage Industry Causes Acute Lead Poisoning

A hobby that grew into a cottage industry produced a case of lead poisoning in one Alaskan adult. The lead poisoning was a direct result of inhaling lead dust and fumes while melting and casting lead. It is important for anyone melting, casting or otherwise handling lead to observe proper procedures for preventing lead exposure and/or poisoning.

Case Report
During June 2001 an adult male visited a physician's office complaining of fatigue and stomach pain with gastric upset for several months duration. A fever of 102° F had persisted for 10 days. Routine blood work-up showed a red blood cell count of 3.59($x10^6$/μ L), a white blood cell count of 20.1($x10^3$/μ L), a hemoglobin of 10.3g/dL, and a hematocrit of 30.5%. The patient was anemic and was found to have a high level of neutrophils in his blood.

A venous blood sample obtained from the patient showed a blood lead level of 133 micrograms per deciliter (μ g/dL), one of the highest blood lead levels ever recorded in the state. The Centers for Disease Control and Prevention (CDC) in Atlanta defines an adult elevated blood lead level as 25μ g/dL and over.

The patient was admitted to a local hospital. Chelation therapy was initiated in consultation with CDC regarding the latest recommended chelating agents and treatment procedures. After completion of chelation therapy, the patient's blood lead level had dropped to 48μ g/dL.

Patient Interview
During an interview conducted by Environmental Public Health Program (EPHP) staff, the patient reported that he had been making lead fishing sinkers and ingots for several years by melting and casting salvaged lead, including spent bullets, discarded sheet lead, and wheel weights. During the melting phase some of the lead (mainly spent bullets) emitted a heavy smoke, most likely caused by the oxidation of some type of lubricant applied to the round during manufacture. The patient referred to the lead that produced the heavy smoke as "dirty" lead. The lead that did not produce this smoke when heated was referred to as "clean" lead. The patient mistakenly thought that there was no potential toxicity in working with the "clean" lead.

Site Visit and Operation Review
During July 2001 staff of the EPHP visited the patient's home to learn about the lead melting and casting operation. The patient usually melted and cast lead into fishing sinkers and ingots outside during the summer months and inside during the winter; however, he had recently discontinued melting lead outside. Sinkers and ingots were kept in two outside storage sheds. At the time of the visit the inventory consisted of 40,000 to 50,000 pounds of lead ingots. The patient used only a paper filter mask for protection against the lead dust, fumes and smoke. He frequently dry-sweeped the area and occasionally used a standard home vacuum cleaner to remove some dust. He sometimes sifted floor sweepings through a wire screen to remove larger particles of lead for re-melting.

The only ventilation in the workshop was a small exhaust hood located directly over the melting and casting area. The hood was vented to the outside and did not contain a filter designed to remove lead dust and fumes.

The patient and his wife are the only residents of the home. His wife's blood lead level was 11μ g/dL, indicating she had not been exposed. The patient is the only one involved with the home-based operation.

Laboratory analysis of dust wipe samples taken from the workshop area and inside the home showed concentrations of lead well above the Department of Environmental Conservation (DEC) tolerance limits of 400μ g/sq.ft. Soil samples were collected from the lawn to determine if lead had migrated to the outside and into neighboring lawns. The lead content in the soil was below the DEC tolerance limit of 400 parts per million (PPM). However, soil directly under the vent hood exhaust port had a lead content of 1,880 PPM, and soil at the door of the outside storage shed, where loading and unloading occurred, had a lead content of 863 PPM.

Conclusions and Recommendations
The patient's elevated blood lead level was associated with melting and casting of lead in his home workshop. The patient has discontinued melting and casting lead and has sold most of his tools, equipment, and lead inventory. Although the levels of lead contaminated dust were reduced significantly after the work area and residence were cleaned, lead levels remain above acceptable limits.

The patient was not aware of the potential hazards involved with melting and casting lead. He had no knowledge of the basic rules and procedures for handling lead safely or how to protect himself from lead exposure. Following a few basic rules and procedures while melting and/or casting lead will prevent most lead exposures:

- Get professional advice concerning proper ventilation of the work area.
- If the operation is home-based, establish airtight physical barriers (such as plastic sheeting) between the work area and entrance doors to your residence while engaged in the activity.
- Use a portable air cleaner equipped with a High Efficiency Particle Air (HEPA) filter. Locate the cleaner as close to the worktable or bench as possible.
- Use a properly fitted National Institute for Occupational Safety and Health (NIOSH) recommended respirator with a HEPA filter. A paper mask is insufficient because minute lead particles easily pass through.

- Never eat, drink or smoke while engaged in the activity.
- Never let small children play in or otherwise frequent the work area.
- Keep the work area clean (including walls, floors, ceilings, worktables/benches, chairs, shelves, tools etc.). Do not allow the accumulation of dust and dirt. Remove dust and dirt with a vacuum cleaner equipped with a HEPA filter, or wet wipe and/or wet mop the area. Never use a standard home vacuum cleaner.
- Wash work clothes separately and allow the washing machine to cycle through another rinse while empty.
- Consider obtaining periodic blood lead tests to monitor lead exposure.

(For more information contact Charles Wood at 269-8000. Thanks to Joe McLaughlin, MD, MPH for technical assistance.)