



Bulletin No. 21

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Lead Poisoning Due to Ceramic Glaze Ingestion

In August 1992, a private physician notified the Section of Epidemiology that two patients at a psychiatric hospital who drank ceramic glaze had elevated blood lead levels. We conducted an investigation of the poisonings and reviewed ceramic glaze usage at psychiatric hospitals and nursing homes in Alaska. In addition, blood lead levels were determined for six activity therapists and three other patients at the hospital. These persons were selected for testing because they had the greatest exposure to ceramic glaze.

Patient 1: On August 18, an 11-year-old male, admitted for treatment of a conduct disorder, consumed approximately 2 fluid ounces of ceramic glaze. He was taken immediately to the emergency room of a nearby hospital where he received gastric lavage and activated charcoal by mouth. A blood lead level drawn 1 hour after the ingestion was 163 ug/dL; zinc protoporphyrin (ZPP) level was 25 ug/dL (normal for laboratory <60 ug/dL). The lead level was not known until 3 days after it was drawn and no chelation therapy was given. Repeat lead levels on August 21, 28, and September 9 were 61 ug/dL, 45 ug/dL, and 35 ug/dL, respectively. No elevated liver enzymes or anemia were observed; however, the reticulocyte count rose to 2.5% 10 days post ingestion. The patient remained asymptomatic.

Patient 2: On August 15, a 58-year-old female, admitted with psychosis and suicidal ideation, consumed approximately 4 fluid ounces of ceramic glaze. The next day, the patient complained of abdominal pain. No lead level was drawn initially. A blood lead drawn on September 1 was 61 ug/dL; ZPP was 105 ug/dL. No treatment was given and the patient had no further gastrointestinal symptoms.

The glazes consumed by patients 1 and 2 contained 25-29% and 42.5% of fritted lead compound, respectively. It is estimated that 0.05% to 32% of the total weight of these glazes is soluble lead.

While lead-based ceramic glaze was routinely used at the psychiatric institution, patients did not make eating or drinking utensils. Blood lead levels of the six activity therapists and three other patients were all <5 ug/dL.

Over the past year, approximately 1,400 patients participated in ceramic therapy programs at the two largest psychiatric institutions in the state; both programs used lead-based glaze. Of 15 nursing homes contacted, 4 had ceramic therapy programs which used lead-based glaze (including the two largest nursing homes in the state). Combined, approximately 50-100 nursing home residents participated in ceramic therapy over the past year.

Unfortunately, the ingestion of ceramic glaze is not rare in the United States. One poison control center reported 318 episodes over a 1-year period and a second reported 75 episodes over a 6-year period. While single-dose ingestions of lead usually do not cause symptoms, a review of 11 cases of acute poisoning following oral lead ingestion described neurologic, gastrointestinal, renal, and hepatic effects at blood lead levels ranging from 50 - 1,118 ug/dL. In 1991, a nursing home resident in Maryland died of lead encephalopathy after ingesting lead-based ceramic glaze.

The extent of lead poisoning due to ceramic glaze ingestion is unknown. Reports to date indicate that residents of psychiatric institutions and nursing homes are at greatest risk. Symptoms of lead poisoning may be difficult to detect in patients with preexisting mental impairments, and the possibility of lead poisoning may not be considered if glaze ingestion is not observed or suspected by a staff member.

Lead-based glazes are used because they provide a wide range of firing temperatures, are easy to mix, and are aesthetically appealing. Although frits contain oxides of lead or other metals fused to silicon dioxide (glass), lead oxide remains highly soluble and the amount of bioavailable lead varies widely.

Public Law 100-695, which took effect in 1990, requires that all art and craft products sold in the United States be labeled in conformance with Standard D-4236 of the American Society for Testing and Materials (ASTM). Under this standard, toxic products, including lead-based glazes, must be marked with a signal word such as "Warning" or "Caution." Glaze manufactured before 1990 may not have a warning label and may contain lead.

Glaze labeled "safe for food containers" or "food-safe" will not leach lead from a correctly fired piece of pottery. However, glaze with these labels may contain lead and could cause lead poisoning if ingested.

Only lead-free glaze should be used where supervision is required such as in elementary schools, nursing homes, hospitals, and psychiatric institutions. Glaze which is labeled both "non-toxic" or "no health label required" and "conforms to ASTM D-4236" does not contain lead. The Alaska Division of Public Health has contacted nursing homes and psychiatric institutions in the state and requested that lead-based glaze not be used.

(Reported by: D.C. Smith, M.D. Contributed by Brad Gessner, M.D., Section of Epidemiology.)