

# Mercury Poisoning in a Toddler from Home Contamination due to Skin-Lightening Cream

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A 17-month-old child presented with hypertension, fussiness, constipation, and arthralgia due to mercury toxicity from a skin-lightening cosmetic used by her mother and grandmother. Blood mercury level was 26 mcg/L and urine level was 243 mcg/g creatinine. She was chelated with succimer. The home was contaminated and needed remediation. (*J Pediatr* 2017;■■■:■■■-■■■).

**M**ercury exposure is a challenging and uncommon diagnosis, with signs and symptoms that in more severe cases overlap with neuroendocrine tumors. This report details our experience with a case of mercury exposure from household contamination from a cosmetic skin-lightening facial cream. Around the globe, mercury-containing creams are marketed for skin lightening, removal of dark spots, and evening of skin tone. The desired skin effects are due to inorganic mercury inhibiting tyrosinase activity and therefore reducing melanin production. Since 1973, US Federal law has prohibited mercury in cosmetics beyond trace amounts (1 mg/kg) due to concern for toxicity.<sup>1</sup> Despite the law, mercury-containing skin creams are an ongoing public health problem in the US.<sup>2</sup> This case report provides our rationale for mercury testing, therapy, our approach to household remediation and evaluation, and provides patient progress over a 200-day period.

## Case Presentation

A 17-month-old previously healthy female toddler with normal development was seen by her pediatrician regarding 3 weeks of fussiness, constipation, decreased appetite, and temperature to 37.7°C. The pediatrician obtained a chest radiograph, which was negative, and a urinalysis, which showed no evidence of urinary tract infection. Two days later, the patient was taken to the emergency department with similar complaints. She had rhinorrhea, congestion, fussiness, and fever of 38.3°C but otherwise had no abnormalities. She was discharged with a presumptive viral syndrome.

In the week after discharge from the emergency department, her symptoms did not resolve and she developed a limp with tenderness in the right knee. After 1 week, she presented again to the pediatrician. An abdominal radiograph showed large stool burden but no other concerning finding, such as radio-opaque foreign bodies. Radiograph of the knee was unremarkable. Repeat urinalysis again showed no evidence of urinary tract infection. She was noted to have a 0.5-kg weight loss and new hypertension (**Figure 1**; available at [www.jpeds.com](http://www.jpeds.com)) above 95th percentile but was afebrile.

She was directly admitted to the hospital (day 1 hereafter), where an endocrine workup was begun. Endocrine studies were obtained and were either within the normal range or modestly elevated (**Table I**; available at [www.jpeds.com](http://www.jpeds.com)). Nuclear medicine single-photon emission computed tomography imaging of the adrenal glands showed no tumors. Renal function was normal.

The patient became increasingly fussy and had poor appetite with continued weight loss, reaching a nadir of 11% (1.14 kg) from admission weight on day 27. She had progressive decrease in ambulation such that she required assistance. After day 1 of hospitalization, rhinorrhea, congestion, and fever had resolved. It is unclear whether she initially had a viral syndrome or whether all presenting symptoms were related to her final diagnosis. She had persistent unexplained hypertension, weight loss, and inability to walk. Endocrine workup had not established a diagnosis. Therefore, heavy metal screening was obtained on day 18. Whole blood mercury was found to be 26 mcg/L (normal <10 mcg/L) with a random spot urine mercury level of 243 mcg/g creatinine (normal <35 mcg/g creatinine) (**Table II**). Arsenic and lead levels were unremarkable.

After the discovery of elevated mercury level on day 18, the patient was further evaluated for clinical signs and symptoms of mercury toxicity and exposure history. She was noted to have mild resting tremor. There was no rash, leukonychia striata (Mees lines), desquamation of the hands or feet, or gingival discoloration (Burton lines).

Multiple conversations with the patient's mother were needed to identify the source of mercury toxicity. Several other mercury sources were considered but denied by the family. After repeated prompting, the patient's mother recalled that she had been using a skin-lightening facial cream at bedtime for 4 months, which she stored in the family refrigerator.

The patient is a first-generation Hispanic American living in a Southwestern US border city. The other members of her household included the patient's 29-year-old mother, with

NG Nasogastric  
PO BID By mouth 3 times per day

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**Table II.** Patient and family urine and blood mercury levels by day since admission

Patients and levels	Normal	Day												
		14	18	23	35	40	46	59	61	94	158	180	202	222
Patient's urine, mcg/g cr	≤35 mcg/g cr	—	243	777	142	770	81	153	—	109	90	58	45	—
Patient's urine, mcg/L	≤10 mcg/L	—	58	101	41	77	13	61	—	12	35	14	13	—
Patient's blood, mcg/L	≤10 mcg/L	26	18	—	—	8	—	—	—	—	—	—	—	—
Mother's urine, mcg/g cr	≤35 mcg/g cr	—	—	—	—	—	—	—	197	—	—	—	—	33
Grandmother's urine, mcg/g cr	≤35 mcg/g cr	—	—	—	—	—	—	—	222	—	—	—	—	43

whom she co-sleeps, 53-year-old maternal grandmother, and uncle. (Note that the uncle declined evaluation and is excluded from discussion.) There were no other children in the household. The patient's maternal grandmother used the cream for at least 5 months, and several friends outside the household also used the cream. There were no cross-border trips within the last several months.

The cream was produced and purchased at a beauty salon in Mexico and was carried across the border by family and friends. They all found the cream to be effective in meeting their cosmetic goals. Several containers of the cream were provided by the family and were sent to the Arizona State laboratory, where they were found to have between 27 000 and 34 000 mg/kg mercury. Her mother and grandmother did not complain of symptoms and had no findings on examination but did have markedly elevated first-void urine mercury levels of 197 mcg/g creatinine for the mother and 222 mcg/g creatinine for the grandmother. Their serum creatinine levels were within normal limits.

Due to continued weight loss, the patient had a nasogastric (NG) tube placed to facilitate feeding on day 24. Chelation was initiated on day 21 using succimer 10 mg/kg by mouth 3 times per day (PO TID) for 5 days and 10 mg/kg by mouth 2 times per day (PO BID) for 14 days. At hospital discharge on day 40, the patient had begun walking and was eating, although NG tube supplementation was continued. Four additional outpatient courses of chelation have been performed using succimer 10 mg/kg PO BID for 14 days. Assessment by a bilingual developmental pediatrician on day 61 noted significant delay in receptive language and fine motor skills on a Bayley Scale. On that evaluation, the patient's mother had reported a 3- to 4-day period of decreased ambulation about 1 week before evaluation. On her most recent evaluation, on day 222, she was noted to be shy, particularly with other children, and to have stereotypical hand-flapping behavior when stressed. Bayley Scale evaluation has not yet been repeated.

## Household Evaluation and Remediation

The family rented a detached single-family residence, which we felt had a high likelihood of contamination. Federal, state, and local agencies were contacted to coordinate evaluation of the home. This was hampered by a lack of resources at the local and state level. Contacts through the Pediatric Environmental Health Specialty Units and Environmental Protection Agency

region 9 resulted in dispatch of a commercial survey team from a neighboring state.

On the initial survey, ambient air mercury vapor levels ranged from 1900 to 2800 ng/m<sup>3</sup> for most areas. Air samples from the clothes washer were 14 150 ng/m<sup>3</sup>, with the dryer at 1767 ng/m<sup>3</sup>. This was felt to represent trapping of mercury within the plumbing of the washer and thermal volatility for the dryer. Wipe samples from the refrigerator and kitchen table were 880 ng/m<sup>3</sup> and 25 090 ng/m<sup>3</sup>, respectively.

The US Agency for Toxic Substance and Disease Registry recommends immediate remediation for mercury vapor >1000 ng/m<sup>3</sup> and recommends occupancy exclusion for levels about 10 000 ng/m<sup>3</sup>.<sup>3</sup> The ambient samples in the household in all cases reached the immediate remediation level. Given that the patient had clinically significant effects attributable to mercury exposure, the home was deemed not safe for continuous occupancy.

Remediation was performed by a private contractor with expertise in mercury cleanup and was paid for by the landlord. Afterward, although mercury was still not at background, the house was deemed safe for occupancy. The family lost personal and household items, including bedding materials and the washing machine, which were too contaminated for remediation. The remediation contractor disposed of these items in a hazardous waste landfill.

Mexican officials were contacted through local border health liaisons. The ensuing investigation resulted in seizure of material in Mexico. The patient's mother was reluctant to give health officials contact information for her friends, but she eventually convinced them to discard the cream. The number of contaminated sites in the community is unknown.

## Discussion

Mercury is a toxic heavy metal with elemental, inorganic, and organic forms. Each form has stereotypical toxicities but all can cause neurologic dysfunction with sufficient exposure. It is unique among heavy metals in that it has a relatively high vapor pressure and significant vapor contamination may occur from both metallic mercury and mercury-containing salts. In this case, the patient was exposed to inorganic mercury (probably mercuric chloride) added to a skin-lightening cream. Exposure was from contact with contaminated people, objects, and vapor as the cream was not directly applied to her skin. Of these, vapor may have contributed the most, and her rela-

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