

## Lead Poisoning Due to Adulterated Marijuana

**TO THE EDITOR:** As a consequence of strict regulations, lead intoxication has not occurred in Germany in recent decades. Recently, during a period of 3 to 4 months, 29 patients (16 to 33 years of age) were admitted to four different hospitals in the greater Leipzig area (population, approximately 650,000) with classic signs and symptoms of lead intoxication. Twenty of these patients were admitted to our hospital (University Hospital Leipzig), 16 on an emergency basis (Table 1). The patients presented with abdominal cramps, nausea, anemia of varying severity, and fatigue. Most patients had basophilic stippling and a “Burton’s line,” and some had neurologic symptoms. In other hospitals, one patient had severe encephalopathy with hallucinations and peripheral neuropathy with permanent extensor palsy in the forearm, and another patient underwent exploratory laparoscopy.<sup>1</sup>

The diagnosis was quickly established, and chelation therapy was effective, but despite great

efforts by health authorities and police, the source of lead could not be identified. After 8 weeks, we detected a common pattern: the patients were young, were unemployed or were students, had a history of smoking, and had body piercings. On questioning, all the patients eventually conceded that they were regular users of marijuana smoked in “joint” form or with the use of a water pipe. We recovered either half-used packages or aliquots of “home supplies” of marijuana from three patients, and we identified elemental lead by means of atomic absorptiometry and  $\Delta$  9-tetrahydrocannabinol by means of high-pressure liquid chromatography. One package contained obvious lead particles (Fig. 1); this strongly indicated that the lead was deliberately added to the package rather than inadvertently incorporated into the marijuana plants from contaminated soil. At this point, we involved the police, and a full criminal investigation was begun. Health authorities immediately

**Table 1. Clinical and Laboratory Characteristics of 16 Patients with Lead Intoxication.\***

Patient No.	Age yr	Sex	Blood Lead Level on Admission $\mu\text{g/dl}$ (normal value, <9.0)	Reported Marijuana Consumption	Abdominal Cramps	Nausea, Vomiting, Weight Loss, and Fatigue	“Burton’s Line”	Neurologic Symptoms	Hemoglobin g/dl
1	24	F	118.3	2 joints/wk	Yes	Yes	No	None	8.7
2	33	F	147.5 <sup>†</sup>	4 joints/wk	Yes	Yes	Yes	Polyneuropathy	7.7
3	25	M	457.0	9 joints/wk	Yes	Yes	No	Headache	10.1
4	23	M	135.7	1 g/day	Yes	Yes	No	Headache	11.3
5	18	M	NA	1–2 g/day	Yes	Yes	No	Headache	9.7
6	23	M	74.2	3 g/day	Yes	Yes	No	Headache	10.0
7	23	M	143.7	1 g/day	Yes	Yes	Yes	Headache	10.1
8	23	M	141.8 <sup>‡</sup>	2–3 g/day	Yes	Yes	Yes	Headache, insomnia	8.1
9	19	M	219.9	1 g/day	Yes	Yes	Yes	Headache, insomnia	7.0
10	25	M	59.6 <sup>§</sup>	4 joints/wk	Yes	Yes	Yes	Headache	6.0
11	26	M	226.6	8 joints/wk	Yes	Yes	Yes	None	9.0
12	22	F	109.8	7 joints/wk	Yes	Yes	Yes	None	10.3
13	23	M	59.4 <sup>¶</sup>	6 joints/wk	No	Yes	Yes	None	14.8
14	33	M	63.1	6 joints/wk	Yes	Yes	No	Polyneuropathy	15.9
15	33	F	100.6	5 joints/wk	Yes	Yes	No	Polyneuropathy	7.2
16	18	F	106.8	2 joints/wk	Yes	Yes	No	None	8.7

\* Patients were admitted on an emergency basis to University Hospital Leipzig during the period between September and November 2007.

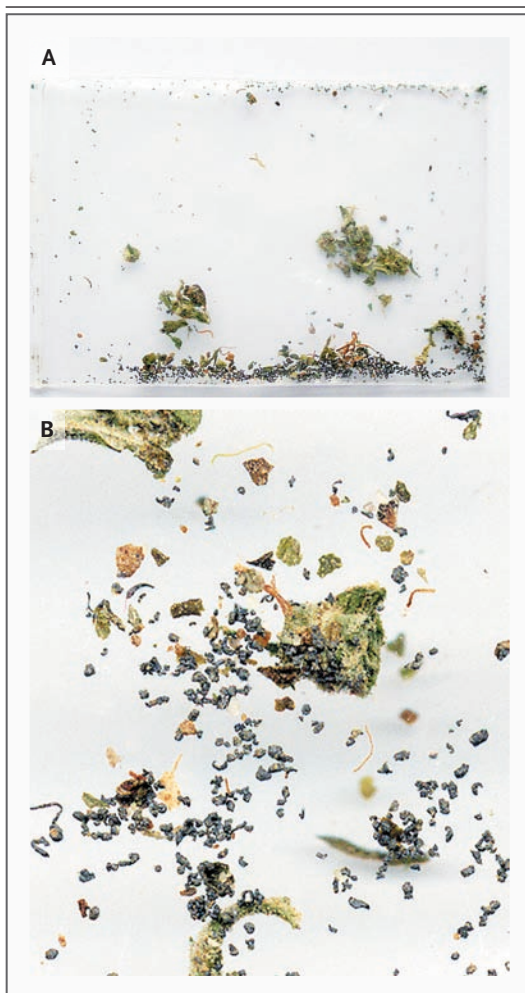
NA denotes not available. To convert the values for lead to micromoles per deciliter, multiply by 0.0049.

<sup>†</sup> The blood level was 89.8  $\mu\text{g}$  per deciliter after 1 week of succimer therapy (at a dose of 100 mg three times a day).

<sup>‡</sup> The blood level was 87.5  $\mu\text{g}$  per deciliter after 1 week of succimer therapy (at a dose of 100 mg three times a day).

<sup>§</sup> The blood level was 43.2  $\mu\text{g}$  per deciliter after 1 week of succimer therapy (at a dose of 100 mg three times a day).

<sup>¶</sup> The blood level was 46.0  $\mu\text{g}$  per deciliter after 1 week of succimer therapy (at a dose of 100 mg three times a day).



**Figure 1. Typical Street-Size Bag of Marijuana.**

In this €10 (\$15.39) bag, which was obtained from a patient, the plant material had been mostly consumed. The small grayish metal particles were identified as elemental lead. They can be easily distinguished from marijuana leaves both in the original package (Panel A) and under the magnifying lens (Panel B).

started an anonymous screening program for marijuana users. After 2 weeks, 145 persons had used this service. A total of 95 of these persons had blood lead levels that required treatment ( $>25 \mu\text{g}$  per deciliter), and some of these persons had dangerous levels of lead ( $>80 \mu\text{g}$  per deciliter).

The current working hypothesis of the police is that because of its high specific gravity and inconspicuous grayish color, lead was used to increase the weight of street marijuana sold by the gram and thereby to maximize profits among dealers. In the material that was obtained, the lead content on average was 10% by weight, which translates into a profit increase of approximately €1,000 (\$1,500.00) per kilogram of marijuana. Lead particles smoked in a joint, which can have a core temperature of  $1200^\circ\text{C}$ ,<sup>2</sup> are very effectively absorbed in the respiratory tract. The medical community, including pediatricians,<sup>3</sup> should consider adulterated marijuana as a potential source of lead intoxication.

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