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Lead toxicity: Chelate at what level?

PETER D. MAGNUS, MD, MPH, deputy director, child health, Los Angeles County Department of Health Services; assistant clinical professor of pediatrics, University of Southern California, Los Angeles County Medical School: I enjoyed the comprehensive article "Lead toxicity from suspicion to therapy" (May 15, 1976, page 80). However, I believe further elucidation is necessary.

According to the chart on relative lead intoxication (page 86), a range of 30-49 μg Pb/dl is considered minimally elevated. However, a lead level in this range is an excessive burden that may manifest itself only in terms of subtle symptomatology in the early school years.

Only the more obvious signs of frank lead poisoning are mentioned in the article; however, recent literature has been filled with concern over neuropsychological sequelae of low-level lead burdens (more than 30 μg/dl) and the difficulty in quantifying levels of future impairment in asymptomatic toddlers with symptomatology manifested in the early school years. These often subtle sequelae of low lead levels include minimal brain dysfunction, hyperkinesis, learning disabilities, and abnormalities of visual-motor functioning, behavior, and attention span.[1-8]

According to the schema of the article, children with blood lead levels of 30-50 μg/dl and high FEPs would merely receive surveillance lead determinations, assuming any iron-deficiency anemia and environmental influences were being corrected. A child is permitted to stabilize at 40-45 μg Pb/dl whole blood and remain at this level, perhaps until puberty! In our Los Angeles experience, this level may yield FEP values ranging from 110 to several hundred μg/dl without iron deficiency. The big question is: If these lower levels of excessive lead burdens are affecting the enzymes in the developing RBCs in terms of heme precursors, what neurotoxic effects do they have? Children more than 5 years old may well have lead values of more than 30 μg/dl, with FEP values less than 60 μg/dl; the younger the child, however, the greater the elevation of FEP due to either a lead burden or iron deficiency.[9,10]

I would be loath to manage a child of 1-5 years whose lead is 78 μg/dl and FEP is 185 μg/dl whole blood as "moderately elevated." According to the article, "as long as the child is asymptomatic, remove the source of lead and check him every 2-3 months (once a month during the summer) until lead levels show a decline" and stabilize at about 40-45 μg Pb/dl. I feel this child merits an initial five-day course of calcium EDTA, at about 50 mg/kg IM,[11] and an eight-hour urine collection after the injection on days 1 and 5 of chelation to assess body (soft tissue) lead burden.

Finally, I feel that the calcium disodium edetate (Versenate) mobilization test or "provocative test" need not be labeled a "sophisticated screening test" used only in "symptomatic patients" and "done by researchers in a hospital setting." The test can be very useful in an in- or outpatient setting to determine the amount of chelatable lead, and hence the need for a full course of chelation therapy. A positive test does not necessarily mean that a child needs to be chelated, but it will give the clinician a better idea of the body lead burden. Perhaps if the test is very positive (either >2 mg Pb/liter of urine, or twice as many μg of lead excreted per liter of urine than mg of EDTA given) most clinicians working with children with plumbism would agree to chelate, even in children with mild-to-moderate blood lead values. A provocative test would not be necessary prior to chelation if the blood lead level is greater than 60 μg/dl on two successive occasions, if paint chips are seen on abdominal flat plates, or if lead lines are present on long bone films. By chelation, I mean use of EDTA alone on an ambulatory basis (combined, of course, with environmental and nutritional amelioration.) Only with extremely elevated lead levels (≥ 70 μg/dl), a symptomatic child, or a horrendous environment should hospitalization be mandatory.

Thus, each case must be considered individually, regardless of classification, and chelation should only be performed after the need has been demonstrated. Health education for the parents, nutritional counseling, and environmental assessment and correction—combined, perhaps, with oral iron to reset the child's "picastat" and correct the iron deficiency—are often more important than the medical management of the burdened child.

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