

Breast-feeding and Child Lead Exposure: A Cause for Concern

It would be difficult to overstate the benefits that breast-feeding provides to infants, mothers, families, and society. Included are benefits to overall child health, nutrition, immunologic function, development, and psychological adjustment.¹ There are relatively few absolute contraindications to breast-feeding. They include infants with galactosemia and mothers with active untreated tuberculosis or who are positive for human T-cell lymphotropic virus type I or type II, those receiving radioisotopes or who have had exposure to radioactive materials, those who are receiving antimetabolites or certain other chemotherapeutic agents or using drugs of abuse, and mothers with herpes simplex lesions on a breast (although infants may feed from the other breast if clear of lesions).¹ Maternal HIV infection is a contraindication to breast-feeding in the United States² but not necessarily so in developing countries.³ In all other situations, decisions about breast-feeding must be made on an individual basis, weighing the potential risks to the infant or mother versus the remarkable number of substantial benefits of breast-feeding.⁴

In this issue of *The Journal*, Lozoff et al report data from 3 countries (Costa Rica, Chile, and the United States, or more specifically, Detroit, Michigan), in 3 different decades, in settings that differed in infant blood lead levels, environmental lead sources, and breast-feeding patterns, all showing higher infant blood lead concentrations associated with longer breast-feeding duration.⁵ This was true for exclusive breast-feeding and for total duration of breast-feeding in each of the countries studied. These findings, as the authors point out, in no way obviate the many benefits of breast-feeding or suggest that breast-feeding be contraindicated, but they do raise a number of important concerns and questions.

Lead remains one of the most common of all childhood toxic environmental exposures. Even though mean blood lead levels of children in the United States have declined precipitously in the past 2 decades and our knowledge of the pathways by which children are exposed has grown impressively (and this article now highlights that breast milk can serve as still another source), so has our knowledge of untoward neurocognitive effects at blood lead levels once believed to be quite safe. In fact, the most recent Statement on the Prevention of Childhood Lead Poisoning by the Centers for Disease Control and Prevention states that there is no known level of childhood lead that can be considered safe,⁶ and analyses of cross-sectional secondary data,⁷ prospectively collected primary data,⁸ a systematic review of the literature,⁶ and meta-analyses of pooled data from 7 international studies⁹ all show decreases of children's IQ associated with increasing blood lead levels below 10 $\mu\text{g}/\text{dL}$, and all indicate that at levels below 10 $\mu\text{g}/\text{dL}$, there is a greater decrease in child IQ associated with increasing blood lead levels than at levels above 10 $\mu\text{g}/\text{dL}$. In addition, findings suggest that lead exposure during the first months of life have adverse effects on weight gain of

healthy, breast-fed infants and that both maternal lead burden and child blood lead levels are negatively associated with post-natal weight gain.¹⁰

Although the findings in the article by Lozoff et al are concerning, they are neither unexpected nor inconsistent with what is already known about the effects of pregnancy and lactation on maternal lead metabolism and the transmission of lead from breast milk to nursing infants. Research consistently demonstrates that nursing infants may be exposed to lead from breast milk. Maternal serum and breast milk lead levels as well as maternal bone lead stores have all been shown to be correlated with infant blood lead levels.^{10,11} Lead from both current maternal exposure and that accumulated in bone from prior exposure are available to the nursing infant via breast milk. Infant blood lead levels at 1 month of age are significantly correlated with umbilical cord^{10,11} and maternal blood¹¹ lead at delivery and with maternal blood,^{10,11} patella,^{10,11} tibia,¹⁰ and breast milk^{10,11} lead at 1 month postpartum. Bone lead stores are mobilized during pregnancy and lactation.¹² Bone houses 95% of the lead in adults,¹³ and as lead remains in bone for up to several decades after external lead exposure has declined, this mobilization may provide a significant exposure to lead by a growing fetus and breast-fed infant. Studies have found a positive association between bone loss with change in breast milk lead concentration.¹⁴ Calcium supplementation has been shown to be moderately effective in lowering blood lead levels in lactating women, but only among women with relatively high lead burden (patella bone lead $\geq 5 \mu\text{g}/\text{dL}$).¹⁵ The good news is that lead in breast milk tends to be concentrated at 3% or less of maternal blood lead levels,¹⁶ and significant elevations of milk lead concentrations in developed countries occur far less often than in developing countries.¹⁷

The most recent US Preventive Task Force guidelines recommend against the routine screening for lead in asymptomatic pregnant women,¹⁸ although New York State and Minnesota require blood lead screening of pregnant women. No federal government or national medical or nursing associations currently offer guidance on how best to monitor blood lead levels of pregnant or lactating mothers, or which breast-feeding children should be screened for lead early in their first year of life. In addition, measurement of lead in breast milk for clinical purposes is not feasible.

What are potential risks for significant levels of lead in breast milk? Our data about this are still incomplete, but they include immigration from developing countries,¹⁹ maternal pica (which is more common in the southern

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United States and in African and Latin cultures),^{20,21} use of imported cosmetics or certain complementary medications from developing countries, recent renovations of older homes, and occupations such as automobile repairs, work in firing ranges, or the manufacture of ceramics, batteries, and stained glass.²²⁻²⁴ In addition, women who had significant lead exposure as children may have elevations of lead in breast milk.²⁵

So what should we take away from this important study? Yes, breast milk may be a source of lead exposure for breast-feeding infants, but at this time it appears that in most cases the risks associated with the small amount of exposure will be far outweighed by the benefits of breast-feeding. In some cases, assessment of pregnant and lactating mothers' blood lead may be useful, but this is not indicated for all women or all breast-feeding infants. As long as the lactating mother's blood lead level is $<40 \mu\text{g/dL}$, there is no reason to stop breastfeeding,⁵ although if breast-feeding mothers have blood lead levels $>5 \mu\text{g/dL}$, one might consider checking the infant's blood lead. As long as the infant's lead level remains $<5 \mu\text{g/dL}$, there appears to be no reason to stop breast-feeding. In the meantime, there is a real need for evidence-based guidelines on lead screening of lactating women and breast-fed infants, valid and practical screening questionnaires to identify which pregnant and lactating women and which breast-feeding infants should be screened for blood lead levels. In addition, we need far better estimates of the numbers and characteristics of pregnant and lactating women who should be screened and far more knowledge of, and better regulation of, complementary and alternative medicines, cosmetics, and dietary supplements. ■

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