

# Maternal Vitamin D Supplementation for Breastfeeding Infants: Will it Work?

Lydia Furman, MD

Infants fortunate enough to be exclusively breastfeeding are at risk for insufficient vitamin D intake, and if vitamin D deficient, are at risk for rickets. Despite an unequivocal recommendation by the American Academy of Pediatrics to provide 400 IU of oral vitamin D daily beginning in the first days postpartum, national studies conducted both before and after publication of these recommendations estimate that only 1 in 5 breastfed US infants achieves this goal.<sup>1-3</sup> Both provider and parent compliance play a role when recommendations are not followed.<sup>4-5</sup>

To address this issue, an elegant prospective randomized double-blind trial by Hollis and colleagues<sup>6</sup> explores an option that has been “food for thought” and study for several years: supplementation of maternal vitamin D as a substitute for infant supplementation. Their trial carefully addressed potentially confounding variables, including latitude, season, maternal skin pigmentation, BMI, and diet. The study was challenged by attrition because of discontinued exclusive breastfeeding, with just 148 of the 389 who were randomized (38%) able to complete the trial, raising another important public health issue. But when the curtain falls, we learn that 6400 IU of daily maternal vitamin D3 for 6 months successfully supports maternal vitamin D status, and the authors’ previous work documents that this produces sufficient vitamin D levels for breastfeeding infants.<sup>6-7</sup>

The results are valuable, but questions remain. Who will prescribe this

medication for mothers, and who will pay for it? And does this strategy shift rather than resolve the compliance burden of vitamin D supplementation?

American Academy of Pediatrics guidelines endorse care by pediatricians through age 26 years, but obviously many mothers are older than this. Although practicable for family practice and combined internal medicine and pediatrics physicians, not all internists or obstetricians will wish to collaborate and treat the mother per this recommendation. Although vitamin D can be purchased over the counter, advising mothers on their medications and supplements is not clearly a wise professional strategy. The study arm providing 2400 IU of vitamin D was discontinued by the Data Safety Monitoring Committee because receipt of this dose “...showed a significant, independent association with infant deficiency...” at visit 4, so uncertain or partial dosing is risky.<sup>6</sup> And vitamin D is not free. Lower socioeconomic status and eligibility for WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children) are risk factors for breastfeeding noninitiation and discontinuation: in an ugly turn of events, could recommending maternal supplementation create another (perceived) barrier to breastfeeding in this subpopulation?<sup>8</sup> Medication compliance is complex and not described by demographic factors alone, but adults with lower health literacy taking long-term medications that do not make them “feel better” (read maternal vitamin D supplementation) are at meaningful risk for therapeutic noncompliance.<sup>9</sup>

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Maternal supplementation has the added potential benefit of improving maternal health, and may be preferable and economically acceptable for many families. This approach, however, should inspire us to brainstorm new strategies for infant supplementation, especially tactics that level the playing field and overcome health disparities associated with breastfeeding. Interestingly, our colleagues to the north have reports of success, with 74% to 80% of parents reporting giving vitamin D supplements, so there is good reason to persevere.<sup>10–11</sup>

Additional potential strategies include beginning infant vitamin D3 in the newborn nursery, partnered with other effective public health programs in the newborn order set, such as hepatitis B vaccination, newborn screening by blood spot, and hearing testing. Certainly it is counterintuitive to insist that infants receiving the “perfect food” must take a dietary supplement, an issue Hollis and colleagues<sup>6</sup> address at length. But in the first days of life, even infants receiving formula alone do not consume sufficient volumes to meet their vitamin D goals; the safety of early universal prescribing, with a brief educational component, is difficult to dispute.

Strategies to overcome financial barriers are needed: Medicaid health maintenance organizations do not issue infant insurance cards for several weeks or the plan may request “prior authorization,” and the cost of multivitamin drops may tip the budget for low- or middle-income families. Free medication alone, however, is not a panacea: a free prescription program in Montreal failed to improve odds of obtaining vitamin D for the infant, with reduced prescription uptake and an increased prevalence of rickets cases over the 4-year study period.<sup>12</sup> WIC serves >50% of infants in the United States,

and WIC dieticians are currently an untapped resource for educating, and supporting vitamin D supplementation.

Other possible stratagems include public health messaging, addition of infant vitamin D to ambulatory electronic medical record order sets, and augmented trainee education. Finally, we need a way to track rates of vitamin D deficiency rickets, rather than just relying on case reports, and a National Registry could facilitate this.<sup>13–14</sup> Excellent studies, like the work of Hollis et al,<sup>6</sup> generate as many questions as answers, and ultimately energize us to tackle tough clinical questions.

#### ABBREVIATION

WIC: Special Supplemental Nutrition Program for Women, Infants, and Children

#### REFERENCES

1. Wagner CL, Greer FR; American Academy of Pediatrics Section on Breastfeeding; American Academy of Pediatrics Committee on Nutrition. Prevention of rickets and vitamin D deficiency in infants, children, and adolescents. *Pediatrics*. 2008;122(5):1142–1152
2. Ahrens KA, Rossen LM, Simon AE. Adherence to Vitamin D Recommendations Among US Infants Aged 0 to 11 Months, NHANES, 2009 to 2012 [published online ahead of print June 7, 2015]. *Clin Pediatr (Phila)*. doi:10.1177/0009922815589916
3. Perrine CG, Sharma AJ, Jefferds ME, Serdula MK, Scanlon KS. Adherence to vitamin D recommendations among US infants. *Pediatrics*. 2010;125(4):627–632
4. Fegan S, Bassett E, Peng Y, Steel O'Connor K. Adherence to complementary feeding recommendations for infants and implications for public health. *Public Health Nutr*. 2015;20:1–12
5. Taylor JA, Geyer LJ, Feldman KW. Use of supplemental vitamin d among infants breastfed for prolonged periods. *Pediatrics*. 2010;125(1):105–111
6. Hollis BW, Wagner CL, Howard CR, et al. Maternal versus infant vitamin D supplementation during lactation: a randomized controlled trial. *Pediatrics*. 2015;136(4):625–634
7. Wagner CL, Hulseley TC, Fanning D, Ebeling M, Hollis BW. High-dose vitamin D3 supplementation in a cohort of breastfeeding mothers and their infants: a 6-month follow-up pilot study. *Breastfeed Med*. 2006;1(2):59–70
8. Progress in Increasing Breastfeeding and Reducing Racial/Ethnic Differences—United States, 2000–2008 Births. *MMWR Morb Mortal Wkly Rep*. 2013;62(05):77–80. Available at: [www.cdc.gov/mmwr/preview/mmwrhtml/mm6205a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6205a1.htm). Accessed June 16, 2015
9. Jin J, Sklar GE, Min Sen Oh V, Chuen Li S. Factors affecting therapeutic compliance: a review from the patient's perspective. *Ther Clin Risk Manag*. 2008;4(1):269–286
10. Crocker B, Green TJ, Barr SI, et al. Very high vitamin D supplementation rates among infants aged 2 months in Vancouver and Richmond, British Columbia, Canada. *BMC Public Health*. 2011;11:905
11. Gallo S, Jean-Philippe S, Rodd C, Weiler HA. Vitamin D supplementation of Canadian infants: practices of Montreal mothers. *Appl Physiol Nutr Metab*. 2010;35(3):303–309
12. Millette M, Sharma A, Weiler H, Sheehy O, Bérard A, Rodd C. Programme to provide Quebec infants with free vitamin D supplements failed to encourage participation or adherence. *Acta Paediatr*. 2014;103(10):e444–e449
13. Weisberg P, Scanlon KS, Li R, Cogswell ME. Nutritional rickets among children in the United States: review of cases reported between 1986 and 2003. *Am J Clin Nutr*. 2004;80(suppl 6):1697S–1705S
14. Singleton R, Lescher R, Gessner BD, et al. Rickets and vitamin D deficiency in Alaska native children. *J Pediatr Endocrinol Metab*. 2015;28(7-8):815–823

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