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Vitamin D deficiency during pregnancy: an ongoing epidemic[1,2]

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In this issue of the Journal, van der Meer et al (1) report a high prevalence of vitamin D deficiency during pregnancy in non-Western women in the Netherlands. These investigators found in their study that >50% of women with darker pigment were vitamin D deficient, whereas only 8% of Western women were defined as deficient. Even at first glance, this is a truly remarkable statistic. However, the actual percentage is far greater than reported. The reason for this is quite simple—the authors of this study were very conservative in their definition of vitamin D deficiency. They defined deficiency as circulating 25-hydroxyvitamin D [25(OH)D] concentrations <25 nmol/L (10 ng/mL). As far as we are concerned, this is an old definition of vitamin D deficiency, and many investigators now define deficiency as < 80 nmol (32 ng/mL) circulating 25(OH)D/L (2, 3). This deficiency cutoff is now based on an array of biomarkers that are adversely affected by nutritional vitamin D deficiency rather than on Gaussian distributions of 25(OH)D concentrations in populations, as were used in the past (2).

Why should anyone be concerned about vitamin D deficiency during pregnancy? After all, the skeletal problems encountered appear to be corrected simply by vitamin D supplementation after delivery. The answer is simple: the function of vitamin D is now known to extend well beyond skeletal integrity (2, 4–7), and thus it would be a tragedy to ignore this information. The next question is, how much vitamin D is required to correct this deficiency and achieve circulating 25(OH)D concentrations of >80 nmol/L? It is certain that, in the absence of meaningful sun exposure, the current adequate intake of 200 IU vitamin D/d is far less than enough. Such an intake will do nothing to maintain nutritional vitamin D status, let alone increase it (2, 8). To increase nutritional vitamin D to meaningful concentrations, dietary intakes of ≥2000 IU/d may be required (2, 8). Clearly, studies investigating the true vitamin D requirement during pregnancy are warranted.

Indeed, we belive that these studies are essential. As mentioned earlier, we believe that they are important because vitamin D deficiency during pregnancy not only is linked to maternal skeletal preservation and fetal skeletal formation but also is vital to the fetal "imprinting" that may affect chronic disease susceptibility later in life as well as soon after birth (5). One need only review a recent report by Javaid et al (9) to appreciate the effect of maternal nutritional vitamin D status on childhood bone mineral accrual. The same may well be true for the risks of developing autoimmune diseases, such as multiple sclerosis (which has recently been linked to seasonality of birth; 10) and rheumatoid arthritis, or of conditions such as malignancy (4, 11). Most important is the role of nutritional vitamin D status in activating the human innate immune system that is reported by Liu et al (7). This seminal article described the way in which circulating 25(OH)D, through the induction of cathelicidin in macrophages, is able to contain *Mycobacterium* tuberculosis. This observation could have profound implications with respect to the treatment of a variety of infections. A final important point is that the induction of cathelicidin in this study did not occur when circulating concentrations of 25(OH)D were ≈20 nmol/L but, rather, occurred only when serum was repleted with 80 nmol 25(OH)D/L. This biomarker of nutritional vitamin D status clearly shows that higher circulating concentrations of 25(OH)D are beneficial to human health. Who would have thought that a "simple nutrient" could possess such global health potential?

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