Whole-body bone mineral content in premature infants measured at full-term age

Dear Sir:

We read with great interest the paper published recently by Wauben et al (1). They determined the whole-body bone mineral content (BMC) of full-term premature infants by dual-energy X-ray absorptiometry (DXA) and also studied the influence of diet on the bone mineralization in these infants. As mentioned by these authors, whole-body BMC has been measured for many years with several other methods, such as single-photon absorptiometry; however, they did not refer to our study of the use of DXA published 4 y ago, which was the first study of its kind (2).

We showed that preterm infants had a lower whole-body BMC (43.3 ± 30.8 g) at full-term age than did infants born at full term (62.4 ± 18.3 g). No significant influence of diet was shown; however, a lower mean whole-body BMC (35.8 ± 33.8 g) was observed in the group fed the preterm formula than in the group fed their own mother’s milk that had been enriched with a fortifier (54.6 ± 22.9 g). We were pleased that Wauben et al confirmed some of our results, especially that premature infants had a lower whole-body BMC at full-term age than did full-term infants at birth. We fully agree with the suggestion by Wauben et al that these findings appear to represent a characteristic of preterm infants rather than a lack of influence of nutritional intervention.

However, we think it most important to interpret DXA-measured whole-body BMC according to weight and not according to length or lean mass as the authors did (see their Figure 1). We showed, in several studies of different groups of infants [e.g., appropriate-for-gestational-age infants (3), small-for-gestational-age infants (3), and infants of diabetic mothers (4)], that whole-body BMC correlates well with gestational age and body length, but even more closely with weight. We concluded from these studies that the interpretation of body-composition data of infants should therefore take into account birth weight rather than gestational age or length. Especially in premature infants, variations in whole-body BMC observed at full term could be related to variations in the individual weights of the infants. We effectively showed that whole-body BMC in premature infants at full-term age is more closely correlated with weight than with length. Therefore, this correlation could explain, in part, the lower BMCs observed in the group fed preterm formula (mean weight: 317 g) than in the group fed enriched mother’s milk (mean weight: 3580 g). The data obtained by Wauben et al seem to confirm this hypothesis. In their study, the group with the lowest weight at full term (ie, the group that was fed mother’s milk fortified with calcium glycerophosphate) had the lowest whole-body BMC and 2 of these infants (15%) had a BMC below the normal range, whereas the group with the highest weight at full term (ie, the group fed a preterm formula) also had the highest whole-body BMC.

The body-composition data reported by Wauben et al showed that fat mass in premature infants at full-term age was higher than that in full-term infants at birth (16%), regardless of diet, reaching a mean value of 20–21% of body weight. They postulated that postnatal, age-matched infants may be more appropriate reference models of body composition for preterm infants than are gestational age–matched infants. On the other hand, we showed previously that the body composition of preterm infants at full-term age is close to the reference body composition of full-term infants at birth (5). The differences between the 2 studies could be explained by differences in either the nutritional management of these infants or in the software used (6, 7).

We conclude that interpretation of data obtained by DXA in premature infants remains difficult and it is not clear whether these data should be compared with those of age-matched or weight-matched infants. Nevertheless, we postulate that whole-body BMC in healthy, premature infants is closely related with weight gain during the first months of life and that osteopenia observed at the time of hospital discharge or at full-term age could disappear rapidly during the first 6 mo of life independent of diet (2).

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REFERENCES


Reply to A Lapillonne and BL Salle

Dear Sir:

Interpretation of measurements of bone mineral content (BMC) in prematurely born infants is difficult: confounding variables such as gestational age, body size, body composition, and dietary intake must all be considered. It is gratifying that Lapillonne and Salle share our concern about this difficulty. The issue of size-related artifacts in the analysis of bone mineral measures was addressed previously by Pren- tice et al (1) in adults and by Molgaard et al (2) in children. These authors share our view that measures of body size, other than total.