Correlations between DHA values (with the use of the ratio of the long-chain polyunsaturated fatty acids n−6 and n−3) in pregnancy and sleep measures on days 1 and 2 are shown in Table 1. In recalculating these correlations, we found, to our embarrassment, that we had failed to delete the data from 3 infants on day 2 because they lacked sufficient time in their cribs to give us reliable sleep measures. Therefore, the correlations in Table 1 are based on data from 17 infants on day 1 and from 14 infants on day 2. (Importantly, in our reanalysis without the data from the 3 infants who had insufficient crib time, we found no significant differences in the sleep measures or in the correlations. In fact, some of the correlations were even greater. Thus, our interpretation of the original data remains unaffected by our reanalysis.) We then obtained correlations between GA (determined by ultrasound in all but 2 cases) and the sleep measures. The first 2 rows of Table 1 list all of the significant correlations (P < 0.05) obtained with either DHA or GA. The third row lists the partial correlations of DHA and sleep measures with the linear effects of GA removed, and the fourth row lists the partial correlations of GA and sleep measures with the effects of DHA removed.

In our original article, we correlated 2 DHA measures—DHA and the ratio of the long-chain polyunsaturated fats n−6 and n−3, with the sleep measures. In our new analyses we ran both sets of correlations and found that the DHA correlations were redundant with the n−6:n−3 correlations. This was expected because the 2 measures had a correlation of −0.92. Because the DHA measure yielded no new information, the correlations with this measure are not included.

The partial correlations fell into 2 patterns. Two sleep states—active sleep and wake—remained correlated with DHA concentrations after the effects of GA were removed, whereas 2 measures of arousal—arousal in active sleep and in quiet sleep—and the ratio of active sleep to quiet sleep remained associated with GA after the association with DHA concentrations was removed. On day 1, the partial correlations of 2 sleep measures with both of the predictor variables (DHA and GA) were not significant. This finding indicates that DHA indirectly affects these sleep measures via an increase in GA.

These analyses suggest the existence of 2 independent pathways and 1 interdependent pathway that relate DHA and GA to sleep measures in infants. Further research is necessary to determine the validity and generality of these conclusions, particularly in light of the lack of effect of DHA supplementation on GA in the study of Olsen et al, in which the comparison of fish-oil supplementation was made with women who received no oil (1), and in other studies (3, 4).

### Table 1

<table>
<thead>
<tr>
<th></th>
<th>AS-d1</th>
<th>AS/QS-d1</th>
<th>Ar/QS/d1</th>
<th>Ar/AS-d1</th>
<th>AS-d2</th>
<th>AS/QS-d2</th>
<th>Ar/QS-d2</th>
<th>W-d2</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHA</td>
<td>0.491</td>
<td>0.572</td>
<td>0.515</td>
<td>0.407</td>
<td>0.678</td>
<td>0.736</td>
<td>0.392</td>
<td>−0.574</td>
</tr>
<tr>
<td>GA</td>
<td>−0.599</td>
<td>−0.592</td>
<td>−0.737</td>
<td>−0.694</td>
<td>−0.462</td>
<td>−0.807</td>
<td>−0.703</td>
<td>0.306</td>
</tr>
<tr>
<td>DHA − GA</td>
<td>0.071</td>
<td>0.227</td>
<td>0.099</td>
<td>−0.254</td>
<td>0.561</td>
<td>0.374</td>
<td>−0.237</td>
<td>−0.536</td>
</tr>
<tr>
<td>GA − DHA</td>
<td>−0.399</td>
<td>−0.307</td>
<td>−0.620</td>
<td>−0.654</td>
<td>−0.056</td>
<td>−0.588</td>
<td>−0.660</td>
<td>−0.193</td>
</tr>
</tbody>
</table>

1 AS, active sleep; AS/QS, active sleep/quiet sleep; Ar/QS, arousals in quiet sleep; Ar/AS, arousals in active sleep; W, wake; d1, day 1; d2, day 2. DHA–GA correlation on day 1 = −0.758; on day 2 the correlation = −0.723.  
2 P < 0.05.  
3 P < 0.01.

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**REFERENCES**


**Bioelectrical impedance analysis for predicting body composition: what about the external validity of new regression equations?**

**Dear Sir:**

In a recent issue of the Journal, Sun et al (1) emphasized the importance of bioelectrical impedance analysis (BIA) for large-scale epidemiologic studies. In their well-designed and detailed investigation, the authors combined several methods to assess different body compartments in 1474 whites and 355 blacks. In a multistep procedure, they used these results to develop a model for predicting total body water and fat-free mass (FFM) from BIA resistance. First, total body fat was calculated by using body weight, body volume derived from hydrostatic weighing, total
body water calculated with the deuterium dilution method, and total-body bone mineral content determined with dual-energy X-ray absorptiometry (DXA). Second, in a regression analysis, these data were used to develop preliminary equations for calculating FFM from BIA resistance. After cross-validation, final equations were derived that fitted to FFM calculated from the multicompartent model with a very high precision ($R^2$ = 0.90 for males and 0.83 for females).

We are well aware of the limitations of previous BIA prediction equations. In recent studies we showed that the widely used equations of Deurenberg et al (2) and Lukaski et al (3) produced large differences in calculations of FFM (4). These differences increased with increasing age and body mass index and were higher in females than in males.

Thus, because we were enthusiastic about having new and better equations for calculating total body water and FFM from BIA measures, we recalculated a data set obtained from 708 white Germans between 18 and 65 y of age (4). In a subsample of 89 subjects, we also calculated FFM from a DXA scan (QDR2000; Hologic Inc, Bedford, MA).

Our results were not very satisfying. FFM calculated according to the equation provided by Sun et al was $4.2 \pm 1.9$ kg ($\bar{x} \pm$ SD) higher than that calculated according to the equation of Deurenberg et al (2), $2.3 \pm 1.3$ kg higher than that calculated according to the equation of Lukaski et al (3), and $3.7 \pm 2.5$ kg higher than that measured by DXA (Figure 1). The overprediction by the equation of Sun et al relative to the DXA measures and other BIA equations was more pronounced in males than in females ($P < 0.001$) and increased with increasing age ($P < 0.001$) and body mass index ($P < 0.001$).

In conclusion, FFM calculated with the new prediction equation of Sun et al was substantially overestimated compared with FFM calculated with other prediction equations and with DXA. This overestimation was higher than the marginal overestimation of $\approx 0.3$ kg observed by Sun et al. What did we learn from our recalculation? The study by Sun et al took advantage of 3 factors: a large population, qualified equations confirmed by a subsequent cross-validation, and gold standard methods. However, after applying their model in our study population, we found the external validity to be questionable. Are BIA prediction equations applicable in general or do we need to have different equations for different populations or devices?

REFERENCES

Reply to U Trippo et al
Dear Sir:

We appreciate the comments by Triippo et al regarding the application of the bioelectrical impedance analysis (BIA) equa-

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FIGURE 1. Bland-Altman plot of fat-free mass (FFM) calculated according to Sun et al (1) compared with that calculated by Deurenberg et al (2) and by dual-energy X-ray absorptiometry (DXA).