Choice of DRI Value for Use in Nutrition Labeling

Dear Editor,

In the October issue of The Journal of Nutrition, Yates (1) argued that the most appropriate dietary reference intake (DRI) value for use in setting a daily value (DV) for nutrition labeling was the recommended daily allowance (RDA) and, indeed, the highest RDA for any age and sex group (excluding pregnancy and lactation). This was in direct opposition to the analysis and recommendation from a Food and Nutrition Board (FNB) of the Institute of Medicine (IOM) committee specifically charged to review application of the new DRI values in nutrition labeling (2). That committee argued for a DV derived from the best estimates of the true requirement of individuals, the EAR values. Beaton (3) identified some issues relevant to application of the DRI in programs directed toward the general public. Yates (1) had not seen this review when her paper was accepted for publication.

The DRI reports (4–6) represent far more than an update of the old RDA reports. With the DRI comes formal recognition of the fact that both nutrient requirements and intakes must be considered as distributions. This principle, and understanding of implications, had been evolving in FAO/WHO and United Kingdom reports since the 1960s and was formally recognized in a 1986 NRC report (7). The final structure of the DRI (4) was heavily influenced by the then-recent U.K. report on nutrient requirements (8) embodying the concept of requirement distributions. The DRI reports went much further. An extremely important addition was the scientific and systematic consideration of the possible ill effects from high intakes of nutrients and the introduction of tolerable upper intake levels (UL). That should mark the end of an implicit assumption of the past, that higher nutrient intakes were likely to be better, with the exception of vitamins A and D, which had been recognized as toxic in high doses. The DRI report on application in assessment (5) addressed the critical concept that intakes represent a distribution. Well-tested and explicitly defended methodologies were presented for both adjustment of intakes to estimate distributions of “usual intake” and for evaluation of those adjusted intakes, using the estimated median requirement (EAR) as the appropriate DRI. The DRI reports have made it mandatory that, in dealing with nutrition and health, one must address distributions of intakes and requirements and be concerned about apparently inadequate and potentially excessive intakes.

The committee that was established to look at application of the DRI in dietary assessment and dietary planning chose to separate its task into considerations of those relating to individuals and those relating to population groups. An unfortunate consequence was that, in the preparation of 2 reports (5,6), the interface between individuals and groups was not critically addressed. That interface has major importance for application of the DRI: in setting a DV for nutrition labeling, in developing the dietary guidelines for Americans, in developing the U.S. “My Pyramid” food guide, and in designing large USDA programs such as the Women, Infants, and Children Program (WIC) and school feeding. Subsequent to completing the DRI series of reports, the IOM, at the request of Health Canada and the USDA, convened a new and independent committee to look specifically at use of the DRI in developing reference values (DV) for the nutritional labeling of foods (2). That committee started from first principles and developed what it judged to be the most appropriate science-based approach to a rational and workable daily reference value (DV) for labeling, based on the DRI reports, the underlying principles of those reports, and the purpose of labeling as defined in its mandate. The traditional approach to setting a DV, now espoused by Yates (1) and earlier by Murphy and Barr (9), was rejected. Both Yates (1) and Murphy and Barr (9) indicated that a major reason for setting the DV as the highest RDA was to ensure the protection of the most vulnerable group (the group with highest need). Their argument was driven by the perception that probability theory should be applied to individuals (each individual should be at low risk, including those with highest need), and hence, the highest RDA should be selected; their argument did not take into consideration the modification of the theory in a situation where probability of inadequacy was low in the whole population. This is an interface issue that should have been addressed in the 2 application reports (5,6) but was omitted. The carefully considered and well-argued approach of the IOM committee (2,10), which found that the stated purpose of labeling would be best served by basing the DV on the best estimate of the true requirement of individuals (i.e., the EAR), was portrayed as misguided and as failing to consider the risks of inadequacy to high-risk individuals.

Although there appears to be agreement that individuals exist as members of groups (3,11,12), it is clear that a major disagreement remains about whether this means that all individuals should consume at least the RDA or whether the real goal in public actions should be to establish and maintain an acceptably low prevalence of inadequate intakes in the group and population. This has highly important design implications with consequences in both efficiency and safety.

Consider a practical example of this conflict of interpretations. In agreement with the specific analysis and recommendation of the DRI committee that looked at application in assessment (4), USDA estimates the prevalence of apparently inadequate intakes as the proportion of individuals with usual intakes below the EAR (13). The RDA has no relevance in such assessment. Table 1 presents such an assessment of children’s intakes for selected nutrients. The only prevalence estimates included in the report (13) were for apparent inadequacy of intake (below the EAR) and for the potential risk of ill effects of excessive intake (over the UL). The report also included the 5th, 25th, 50th, 75th, and 95th centiles of usual intakes. Table 1 includes derived estimates of the proportion of individuals failing to achieve the RDA for their age group and failing to

1 Abbreviations used: DRI, dietary reference intakes; DV, daily value; EAR, estimated median requirement; IOM, Institute of Medicine of the National Academies; RDA, recommended dietary allowance; UL, tolerable upper intake level.

2 Defined as EAR + 2 SD

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TABLE 1  USDA assessment of nutrient intakes of children in 2001–2002

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Age, y</th>
<th>Below EAR</th>
<th>Below RDA</th>
<th>Below DV</th>
<th>Above UL</th>
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<tbody>
<tr>
<td>Vitamin A</td>
<td>1–3</td>
<td>&lt;3</td>
<td>7</td>
<td>&gt;95</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>4–8</td>
<td>4</td>
<td>40</td>
<td>&gt;95</td>
<td>&lt;3</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>1–3</td>
<td>80</td>
<td>90</td>
<td>100</td>
<td>NA</td>
</tr>
<tr>
<td></td>
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<td>80</td>
<td>91</td>
<td>100</td>
<td>NA</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>1–3</td>
<td>&lt;3</td>
<td>&lt;5</td>
<td>65</td>
<td>&lt;3</td>
</tr>
<tr>
<td></td>
<td>4–8</td>
<td>&lt;3</td>
<td>&lt;5</td>
<td>63</td>
<td>&lt;3</td>
</tr>
<tr>
<td>Vitamin B-6</td>
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<td>&lt;5</td>
<td>75</td>
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</tr>
<tr>
<td></td>
<td>4–8</td>
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<td>&lt;5</td>
<td>75</td>
<td>&lt;3</td>
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<td>5</td>
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<td>&lt;5</td>
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<td>4</td>
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<td>95</td>
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<td></td>
<td>4–8</td>
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<td>11</td>
<td>90</td>
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<td>&lt;5</td>
<td>90</td>
<td>69</td>
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<td>&lt;5</td>
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<td>&lt;3</td>
<td>&lt;5</td>
<td>&gt;95</td>
<td>NA</td>
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<tr>
<td></td>
<td>4–8</td>
<td>&lt;3</td>
<td>&lt;5</td>
<td>&gt;95</td>
<td>NA</td>
</tr>
</tbody>
</table>

1 Based on data presented in What We Eat in America, 2001–2002 (13).
2 1–3 y, n = 798; 4–8 y, n = 920.
3 Based on age-specific DRI.
4 Interpolated from centiles of intake and may be in error.
5 DV set as highest RDA of all age and sex groups (except pregnancy and lactation) as proposed by Yates (1).

achieve the DV calculated as proposed by Yates (1) and Murphy and Barr (9). Admittedly, choosing to display data for children represents an extreme example, yet it illustrates an issue that applies to all DRI age-sex groups and represents the situation in the group that seems to have attracted the most programmatic attention over the years. The first feature to note is that the estimated prevalence of apparent inadequacy is considerably lower than the proportion of individuals with intakes below their own RDA. For example, for vitamin A in 4 to 8–y-olds, only 4% of individuals may have inadequate intake, although some 40% had intakes below their RDA. Clearly, achievement of the RDA is not necessary to prevent inadequacy of intake. For a randomly selected individual in that population subgroup, the probability that his or her usual intake is inadequate is 4%, or 0.04. This perspective does not appear in the arguments of Yates (1) or of Murphy and Barr (9). The second feature to note is obvious: almost all children have intakes below the DV proposed by Yates (>95% in both age groups for vitamin A).

Yates (1) states her position on application of the DV as follows: “the purpose of the DV on a Nutrition or Dietary Supplement Facts panel should be to provide guidance to the individual about how 1 serving will assist in meeting that person’s daily goal for consumption” [p. 2458; Yates’s emphasis]. The purpose of labeling, as stipulated by Health Canada, USDA, and the IOM when establishing the labeling committee (2), did not include any suggestion that the DV should be promoted as the target intake for individuals (3). Such an interpretation would encourage an increase in intake for preschool and school children. For many if not most nutrients, this could convey a benefit to the <4% of children who were not already meeting their own requirements (Table 1). Setting the DV as an intake goal and attempting to achieve it for all individuals would have to shift the distribution of intakes upward and almost certainly increase the risks associated with excessive intake. The net effect would be increased risk of harm with minimal expected benefit. If such an application of the DV is not its intended purpose, now or in the future, then Yates’s core argument is left without a foundation, and the position of the IOM committee (2) takes on greatly increased strength.

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