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Letters to the Editor

Synthetic folic acid vs. food folates

Sir,

In his reply[1] to my recent letter[2], Geoffrey Cannon queried whether the synthetic nature of folic acid might independently be a problematic factor in the planning of a mandatory fortification policy. If so, what implications are there for all other synthesised nutrients used as supplements and fortificants? Also, is there any evidence that unusually high consumption of folate from foods could do any harm?

Several studies have reported pharmacokinetic differences in absorption and metabolism between synthetic folic acid and food folates. For example, Kelly *et al*. report that the substance's form has different effects on folate-binding proteins and transporters[3]. They found that folic acid can be passively absorbed and interacts differently from 5-methyltetrahydrofolic acid, which is the substrate made available from dietary folates. This is a complex area. Discrepancies in the evidence base for the relative bioavailability of natural folates compared with folic acid have been identified[4].

Clearly, there are many unknowns about the absorption and metabolism of synthetic folic acid (other synthesised nutrients need to be considered on a case by case basis). Mandatory folic acid fortification would result in the target group and the population as a whole being exposed to historically unprecedented raised levels of folic acid over extended periods of time. Hence, there is a need to conduct a particularly comprehensive risk–benefit analysis for such an intervention.

I am not aware of any evidence that unusually high consumption of folate from foods could do harm. This lack of evidence probably has more to do with self-regulation than with the form of the substance. Many authorities have set the upper level of safety for folic acid at 1000 $\mu g\,day^{-1}$, and exclude food folates from this estimate (the estimate is based on studies in which supplemental folic acid was taken in addition to diet). Hypothetically, and drawing on the dietary folate equivalent calculation, 1000 μg of folic acid as a fortificant would equate approximately to an additional 1700 μg of food folates per day – that is a lot of fruits and vegetables to eat!

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References and standards for infant and child growth

Sir,

Geoffrey Cannon[1] says kind things about my contributions in this field, but on one point he goes far astray. He writes 'the idea that reference values are not normative is an obvious contradiction in terms'. Not so. The original paper[2] recommending the NCHS growth charts as an international reference said very clearly: 'A *reference* is a device for grouping and analyzing data and for enabling comparisons between different populations. It implies nothing about values or targets... A *standard* embodies the concept of a norm or target – that is, a value judgement'. Inevitably the two concepts have been confused in practice and the reference used as a norm.

In 1976 there was an urgent need for a means of assessing and comparing different groups of children. The NHCS was chosen as a reference, in spite of its well-known disadvantages, because it included measurements of height and length, and was well worked out statistically. There followed an enormous amount of work and discussion about whether it was realistic to use it as a normative standard, particularly for height, for different populations. Now, 30 years later, the NCHS has been superseded by a new internationally based reference which can reasonably be used as a standard or norm as well as a reference[3].

From my point of view, the most important contribution of the NCHS reference was that it enabled the traditional index of weight-for-age to be separated into two biologically different components: weight-for-height and height-for-weight. I proposed the terms 'wasting' and 'stunting' for extremes of deficits in these two components, because they describe what one actually sees, in a more graphic way than more speculative names such as 'acute' and 'chronic' malnutrition. Certainly these two names imply a value judgement or norm, since they are defined as deviations of more than 2SDs below the reference mean.

Nevertheless, in spite of uncertainty about the validity of the reference, I believe that a high prevalence of stunted children in a population is an indicator of a disadvantaged environment, though precisely what the disadvantage is, whether nutritional, repeated infection or whatever, we do not know. An economist has described stunting as a beneficent adaptation, because a stunted child needs less food. That may be so, but the 'adaptation' comes at a huge cost. The stunted child is impaired in mental as well as in physical development, as shown by the studies of Grantham-McGregor *et al*. In a recent series of papers in the *Lancet*[4] some workers have found that stunting is reversible when the child is transferred to a better environment, others not. A fascinating paradox is described by Satyanarayana *et al*. In India[5] poor children at 5 years of age had a very large height deficit compared with their well-to-do peers; between 5 and 18 they grew as much in stature as children in California, but they never made up the deficit with which they started.

Thanks to the NCHS we know a good deal about the natural history of stunting. I am not well up on the literature; I know of little work on the biochemical or metabolic defect that is holding back growth. Perhaps there may be a hint in the finding of Millward's group that rats on a low-protein diet had decreased synthesis of the proteoglycans of cartilage[6], but that is only a beginning.

Why do I go on about this? I ask myself does the 'new nutrition science' provide any stimulus to tackle the old but very important problem of stunting – a problem that involves nutritionists at all levels: the biochemist, the epidemiologist, the administrator? I can't see that it does.

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Geoffrey Cannon replies

Sir,

It is a pleasure and a privilege to debate these important matters with a great nutrition scientist whose contribution in particular to world child health is fundamental. Others should join in.

John Waterlow points out that the intention of the consultation he chaired[1] in identifying the US NCHS growth curves as 'references', was not to be normative. Respectfully, this is by the way. What matters is what then happened: not intentions, but effects. What I said – as he does – is that the NCHS numbers inevitably became values as soon as his paper was endorsed and the growth curves issued by the relevant UN agencies. Plus, once the word 'value' is added, as in 'reference value', the term becomes normative – and, if the concept that 'reference' is neutral is preserved, a contradiction in terms.

The growth charts for infants and children derived from the NCHS studies of formula-fed babies[2] became accepted as the norm – and still are, and will be, until they are everywhere discarded in favour of the new standards based on breastfed babies[3]. We now know that the numbers based on formula-fed children in the USA were an 'overshoot': the NCHS-derived charts identify a proportion of babies as 'failing to thrive' when they are actually growing at the natural rate, and as healthy when in fact they are overweight. As a result, paediatric health professionals all over the world, from chief government officers to volunteers equipped with a growth chart, a pencil, scales, a ruler and a dozen boxes of tins of infant formula and dried milk donated by the manufacturers, were – and still are – in the business of pushing growth. The human race has been and still is being reshaped, no doubt about that.