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Letter to the Editor

Mandatory folic acid fortification and the science of 'sociality'

Sir,

In his recent Out of the Box column, Geoffrey Cannon[1] comments that mandatory folic acid fortification (MFAF) of food is an 'outstanding example' where nutrition as a classic biological science can be a science of 'sociality', i.e. its findings translated to inform policy to benefit society as a whole.

However, MFAF is a more complex policy debate than often is recognised.

According to the Codex Alimentarius Commission, a national MFAF policy is indicated where there is scientific evidence of *a population-wide deficiency* of folate and related conditions such as anaemia are endemic[2]. In such circumstances MFAF is unambiguously a nutrition policy in the interests of society as a whole.

However, Geoffrey Cannon is referring to MFAF in the context of a policy response to evidence of the relationship between an increased dietary folate intake and reduced risk of neural tube defects (NTDs). Although the biological mechanism and precise dose required for folate to exert its protective effect in reducing NTD risk are uncertain, it is thought to be a compensation for a congenital defect in certain *at-risk individuals* who have limited ability to metabolise folate[3]. The protective effect is consistent with a *therapeutic-type response* and is exerted in a dose–response relationship requiring substantially higher amounts (up to 4 mg day^{-1} for maximum effect)[4] than presently consumed as folate from foods, rather than addressing a conventional folate deficiency.

The central dilemma concerning prophylactic folic acid use here is that approximately half of all pregnancies are unplanned and by the time many women are aware they are pregnant the neural tube will have closed. Therefore MFAF is an appealing policy because it ensures passive exposure by the target group, requiring no behaviour change during the critical periconceptual period. Also, it is equitable[5]; all women regardless of background or circumstances will be exposed.

Yet, because the policy intervention is non-discriminating, it will expose all children, teenagers, adults and older people who consume the fortified food(s) to raised levels of synthetic folic acid. In this context, MFAF represents a 'mismatch' between the genetic nature of the problem and the population-wide scope of the policy solution[6]. The existence of this mismatch is relevant because it casts doubts over whether the interests of either the target group (women of childbearing age) or the population in total are best served by such a policy.

For the target group, the benefit of MFAF in terms of reduced incidence of NTDs is clear. However, a dietary folate intake of 1 mg day^{-1} for adults is the upper level of safety in many countries, especially due to concerns about possible masking of the symptoms of vitamin B_{12} deficiency[7]. In recognition of this concern, policy-makers have had to curtail the extent of fortification and this in turn has restricted the potential benefit. For example, Food Standards Australia New Zealand has proposed a level of mandatory fortification at 80–180 μg of folic acid per 100 g of breads[8]. Whereas at this level it is estimated the dietary folate intake of only a small proportion of the population will exceed the upper level of safety, it is also estimated that just 26 of the approximate 300–350 affected pregnancies in Australia each year will be prevented[8], i.e. just 8% of the total. In addition, the possible relationship between raised exposure to folic acid and increased twinning remains a health concern[9].

For the population in total, additional folic acid intake has been hypothesised to be advantageous to the wider population – by lowering plasma homocysteine levels and thereby reducing cardiovascular disease risk and by improving cognitive function. However, the findings of several recent studies now refute these hypotheses and even suggest that elevated folic acid status may be a potential risk factor for these conditions[10–13]. Moreover, the findings of other recent trials indicate that raised exposure to folic acid is a potential risk for colorectal cancer[14] and breast cancer[15].

Also, a US study identified unmetabolised folic acid in the circulation of 78% of postmenopausal women and showed that there was an inverse relationship between this and a measure of immunity (natural killer cell cytotoxicity)[16]. This is a particular concern because, following the introduction of MFAF in the USA, folic acid intake is estimated to have been twice the projected average increase in intake[17]. As a result, the mean serum folate levels in all age and sex groups have more than doubled[18].

Rather than providing the outstanding example that Geoffrey Cannon suggests, MFAF serves to illustrate the scientific and ethical uncertainties that can arise when translating nutrition evidence relating to specific groups to food policies that have a population-wide impact. Clearly there are benefits from MFAF for at-risk individuals, but it remains uncertain whether these benefits outweigh the potential risks. For society as a whole there is an ethical dimension to consider in balancing the interests of at-risk individuals with the interests of the population in total. Where MFAF policy exists, adequate monitoring is

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essential so that potential risks and benefits can be determined for the target group and society as a whole.

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