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Fortification of food with folic acid and the prevention of neural tube defects

Carol Bower

It is now over 10 years since the publication of the randomized controlled trials confirming the reduction in risk of neural tube defects in the offspring of women taking periconceptional supplements containing folic acid.[1]

Health promotion campaigns have been conducted in many countries to inform women of the link between folate and neural tube defects, and to encourage them to increase their periconceptional folate intake by either dietary means or with a folic acid supplement (or both). Results of these efforts have been remarkably similar, achieving maxima of around 60–80% of women knowing about the link between folate and neural tube defects and about 20–50% of women taking periconceptional folic acid supplements.[2,3]

Because health promotion campaigns alone do not seem to reach all women, and because many pregnancies are unplanned (55% in one New Zealand study[4]), achieving a high proportion of women taking periconceptional folic acid supplementation may be unattainable. Thus, fortification of a staple food with folic acid has been advocated, and voluntary fortification was approved in Australia and New Zealand in 1995. The paper by Green et al in this issue[5] examines the effect of fortified foods on the intake of folate in women of childbearing age in New Zealand, and concludes that current voluntary fortification is inadequate in achieving the public health response required to prevent neural tube defects. Their careful analysis and modelling of several options of fortifying milk, flour or bread, leads to a recommendation of mandatory fortification of bread at 150 µg folic acid per 50g serve. This would have the effect of most women (~60%) obtaining 200 µg daily or more, whilst limiting high intakes to only a small proportion of particular segments of the population, such as the elderly.

Voluntary fortification retains an individual's right to choose whether or not to consume folate-fortified food, but the main reason for fortification in the first instance is to ensure that women unaware of their need for increased folate can still obtain sufficient amounts to prevent neural tube defects in their offspring. It seems unlikely, therefore, that such women would know to choose folate-fortified food. Voluntary fortification also places the onus on the manufacturer to determine whether or not to fortify. Whilst manufacturers may be willing to add folic acid to their products (and many already have, especially breakfast cereal manufacturers), it seems shaky ground indeed to allow public health policy to be dependent on the whim of market forces.

In New Zealand, the prevalence of neural tube defects in the late 1970s and early 1980s was close to 2/1000,[6,7] similar to the rates in several Australian states at that time.[8,9] However, the New Zealand rate appears to have fallen gradually[10] to around 1/1000 in 2000 (22 livebirths and 32 terminations of pregnancy).[5] Australia-wide data from the National Perinatal Statistics Unit show a similar gradual decline in neural

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tube defects, but terminations in this data set are known to be incompletely reported.[11] Australian state birth defects registers (South Australia, Victoria and Western Australia) with close to complete ascertainment (including terminations of pregnancy), report a steady rate of neural tube defects (1.6–2.0 per 1000) until 1996, with a 35–45% fall in prevalence from 1996 onwards.[3,12,13] All three states have seen the benefit of health promotion strategies in improving women's and health professionals' knowledge and practice and, of course, all have been exposed to voluntary fortification.

Whether the more gradual fall in neural tube defects in New Zealand is related to folate is not clear, but an important potential reason to exclude is the under-counting of terminations of pregnancy. As methods of prenatal screening and diagnosis have improved, most pregnancies with neural tube defects are now diagnosed prenatally and the pregnancy terminated, and so it is critical to count both terminations and births when evaluating the role of folate in their prevention.

Green et al advocate monitoring the effect of mandatory fortification using the measurement of red cell folate in population samples, as they say that it may take some time before a fall in neural tube defect can be detected with confidence.[5] Whilst red cell folate monitoring is a good interim measure, monitoring neural tube defects is also important and likely to provide valuable outcome measures in a relatively short time frame. Based on the estimate by Green et al[5] of 60% women getting =200 µg folate daily if breads were fortified at 150 µg/50 g, and assuming a 42% reduction in neural tube defects amongst these women,[14] we would expect a 25% fall in neural tube defect over all births in New Zealand, or 13 babies a year spared the devastating consequences of a neural tube defect. A fall of this magnitude would be able to be detected as a difference from the present rate of ~1/1000 at the 5% level of significance, after only three years of full implementation of mandatory fortification. Such an evaluation, of course, is predicated on complete and consistent ascertainment of neural tube defects before, during, and after the intervention.

Author information: Carol Bower, Principal Research Fellow and Clinical Professor, Centre for Child Health Research, University of Western Australia, Telethon Institute for Child Health Research, Perth, Australia

Correspondence: Professor Carol Bower, Telethon Institute for Child Health Research, P O Box 855, West Perth, Western Australia 6872. Fax: +61 (0) 8 9489 7700; email: carolb@ichr.uwa.edu.au

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