# What side is your bread buttered on?

## Mandatory fortification of bread with folic acid: the debate

In 2007 the New Zealand Food Safety Authority authorised the fortification of bread with folic acid with the primary purpose of decreasing the number of pregnancies affected by neural tube defects.[1] Bread manufacturers were given a transition time for implementation within two years, with full compliance expected by September 2009, with the exception of organically made bread. The level of fortification was set at 80–180 micrograms folic acid per 100g of bread.

### The facts

- The last National Nutrition survey in 1997 showed that the median daily folate intake from food for New Zealand women aged 25–44 years was 213 micrograms. This is below the 400 micrograms per day recommended for women planning a pregnancy and 600 micrograms per day for pregnant women.[2]
- In addition to dietary intake, women planning pregnancy or who are in the early stages of pregnancy, are recommended to take a 800 micrograms folic acid tablet daily for at least four weeks before, and 12 weeks after conception.[3] Supplementation during this period is still necessary even if folic acid fortified bread is consumed. Also see page 34: folic acid supplements
- Not all cases of neural tube defects can be prevented. A daily intake of 400 micrograms of folic acid reduces the risk of neural tube defects by about 70%.
- The proposed level of fortification is expected to increase average daily folic acid intakes among women of childbearing age by 140 micrograms per day.[4] This would meet about 25% of the recommended intake and is estimated to result in a reduction of between four to 14 neural tube defect affected pregnancies in New Zealand each year.

### The debate

**The case against:** Bread should not be fortified with folic acid because there is doubt that women would eat enough bread to have a significant effect on folate levels, there are safety concerns for some groups of people and freedom of consumer choice is compromised.

Professor David Smith, summarises his views as follows:

> "Are the benefits to a few outweighed by possible harm to some of the many exposed?
>
> Increased folic acid intake leads to elevated blood concentrations of naturally occurring folates and unmetabolised folic acid. Unmetabolised folic acid may be related to decreased natural killer cell cytotoxicity, and increased folate may reduce the response to antifolate drugs used for malaria, rheumatoid arthritis, psoriasis and cancer. In elderly people, high folate levels in combination with a vitamin B12 deficiency, may be associated with an increased risk of cognitive impairment and anaemia. Folate protects against cancer initiation but facilitates progression and growth of pre-cancerous cells and subclinical cancers.
>
> Nations considering fortification should be cautious. Further research is needed to identify the effects, good and bad, caused by

a high intake of folic acid. Only then can authorities develop the right strategies for the population as a whole."

— **David Smith**, Professor of Pharmacology, Department of Physiology, Anatomy and Genetics, University of Oxford, UK.

One of the primary concerns surrounding mandatory folic acid fortification is the possible negative effect on the incidence of cancer.[5, 6] Although folate could prevent cancer in healthy people, an accumulating body of evidence suggests that it might also promote the progression of pre-malignant and malignant lesions.[6, 7]

There is also concern about potential adverse effects of circulating blood levels of "free" or unmetabolised folic acid. Evidence indicates that moderate intakes of folic acid supplements may exceed the body's capacity to convert folic acid to the forms of folate that are used for metabolism. This leads to "spillover" and the appearance of unmetabolised folic acid in plasma.[8, 9] The consequences of this are unknown but could, theoretically, be detrimental as the interaction of folic acid with folate receptors and folate binding proteins differs from natural food folates. For example, in a cross-sectional study of post-menopausal women, unmetabolised folic acid from dietary sources and supplements compromised natural killer cell cytotoxicity – a potential first line defense against cancer.[10]

Associate Professor Mark Lawrence says:

"Mandatory folic acid fortification is associated with many scientific uncertainties and ethical dilemmas. By their own calculations Food Standards Australia New Zealand have estimated that this policy will prevent just 8% of neural tube defect cases in Australia and New Zealand - in other words 92% of cases will NOT be prevented with this policy. It has been reported that other approaches such as promoting folic acid supplement use may be more effective, unfortunately there has been little sustained investment in such alternative approaches.

There are a number of potential risks associated with raising the population's exposure to folic acid. These potential risks include the masking of the clinical symptoms of vitamin B12 deficiency, particularly among older adults, and a possible relationship with promoting the progression of bowel cancer. In addition, mandatory folic acid fortification will compromise consumer choice and unless they choose organic bread, all children, teenagers, adults and elderly people who consume bread will be exposed to raised levels of synthetic folic acid. The most critical issue now is for adequate and timely monitoring and surveillance mechanisms to be put in place, so that the potential risks and benefits associated with mandatory folic acid fortification can be evaluated into the future."

— **Mark Lawrence**, Associate Professor of Public Health and Nutrition, School of Exercise and Nutrition Science, Deakin University, Australia.

Professor Jim Mann says:

"The risks of fortification are small but so is the evidence for benefit in a country like New Zealand. If fortification is introduced, then monitoring is essential."

— **Jim Mann**, Professor of Human Nutrition and Medicine, University of Otago, New Zealand.

**The case for:** Bread should be fortified with folic acid to reduce the incidence of neural tube defects. This is a good way to ensure that women of child bearing age have satisfactory levels of folate, should they become pregnant.

Professor Max Kamien has long been an advocate for the fortification of staple foods to eliminate deficiency diseases. He says:

"Despite evidence of the beneficial effects of fortification, any attempt to improve the public's health by "tampering" with their food or water

invariably provokes a predictable and repetitive pattern of opposition. Opponents of fortification ask if it is ethical to medicate a conscious and mentally competent adult without obtaining their informed consent – they do not ask if it is ethical to deny potential benefits to populations and socioeconomic classes at risk.

In the case of folic acid, the problem with public education campaigns is that the information has to reach the public, they have to act on it and women have to know when they wish to fall pregnant. There is a persisting fear that folic acid fortification will mask the development of pernicious anaemia in elderly people and therefore lead to neurological damage. However experience in 50 countries that have mandatory fortification with folic acid has not shown any apparent increase in neurological disorder."

— **Max Kamien**, Emeritus Professor of General Practice, University of Western Australia.

Evidence shows that mandatory folic acid fortification programmes in other countries have significantly reduced the incidence of neural tube defects in infants. In addition, concerns that folic acid supplementation could mask pernicious anaemia and cause cancer have not been substantiated to date. There have been no reports of population level adverse effects from more than 50 countries with mandatory fortification programmes.

A mandatory folic acid fortification programme introduced in the United States and Canada over ten years ago has resulted in significant increases in dietary intakes and blood measurements of folate in the general population.[11] Marked reductions in rates of neural tube defects (19–49%) have occurred across North America.[12-14] A recent population study from Canada found that the prevalence of neural tube defects decreased from 1.58 per 1000 births before fortification to 0.86 per 1000 births post-fortification.[12]

A substantial proportion of women remain unaware of the need to take folic acid during the periconceptional period, and an even higher proportion is not implementing the recommendations despite sufficient knowledge.[15]

Professor Murray Skeaff offers the last word:

"Should we have folic acid fortification of bread? Yes! But it must be accompanied with a systematic programme to promote folic acid supplement use by women of child bearing age inasmuch as supplement use – even if only for planned pregnancies – will prevent more neural tube defects than fortification. Supplement use delivers the right dose at the right time but only to women who take them – therein lies the rub. Fortification reaches all women but delivers considerably less than the optimal dose. Folic acid fortification will prevent some neural tube defects, however, there is considerable uncertainty about how many neural tube defects will be prevented in New Zealand. The prediction is seven each year, however, it may be as low as four or as high as 14."

— **Murray Skeaff**, Professor of Human Nutrition, Head of Department Human Nutrition, University of Otago, New Zealand.

**The verdict:** Discuss with your colleagues, have a practice debate. Let us know your verdict.

Email **rebecca@bpac.org.nz**

**See page 32 to read more about "Vitamins and minerals: dietary sources, supplements and deficiencies".**

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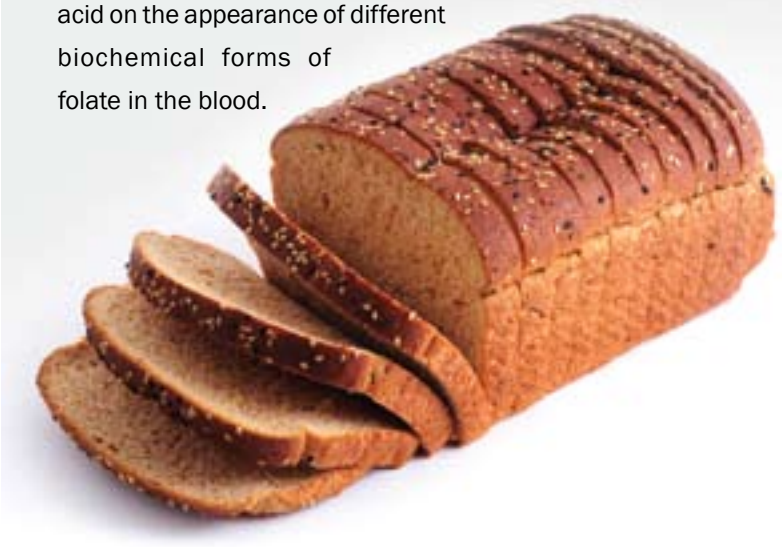
## Monitoring the folic acid fortification programme

As part of the fortification programme, the Food Safety Authority of New Zealand will implement a monitoring strategy to "maintain a watching brief on any scientific developments which may potentially alter the understanding of risk to public health and safety".[4] However there is currently a lack of baseline data on the folate status of the New Zealand population.

Research has begun at the Human Nutrition department of the University of Otago to measure the increase in plasma and red blood cell folate concentrations in New Zealand women. This will enable a more accurate prediction of neural tube defects that will be prevented. It will also provide a baseline assessment of folate status against which to measure the effects of fortification. A secondary objective is to determine the effects of folic acid on the appearance of different biochemical forms of folate in the blood.



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