

Background paper for Ministry of Health request for a subsidised iodine tablet of at least 150 µg/day.

Iodine deficiency in New Zealand – mandatory fortification is being introduced

In New Zealand there is a reoccurrence of iodine deficiency. Mandatory fortification of bread with iodine will come into effect in New Zealand by September 2009. This will be in the range of 25-65 mg iodine per kg of salt which will be added to all yeast-leavened bread (excluding organic and unleavened bread). This level of fortification is expected to increase iodine intakes in the population in the range of 30-70 µg/day, providing that 2-3 slices of fortified bread (depending on the thickness) are eaten.¹

For the general population mandatory fortification of bread with iodised salt should ensure that the Recommended Dietary Intake for iodine (RDI) is met (providing fortified bread is eaten).

However, pregnant and breastfeeding women, and their infants, despite mandatory fortification, will continue to be at risk of iodine deficiency because of their higher requirements. This is the rationale for securing an iodine tablet of at least 150µg/day at low or no cost for these women.

Background to the rationale for needing a tablet in addition to mandatory fortification

The prevalence and severity of iodine deficiency in New Zealand is significant and mandatory fortification with iodine is considered the most effective strategy to address it.² This conclusion was reached after consideration of a variety of studies on the re-emergence of iodine deficiency in the New Zealand population which have accumulated since the late 1980s.

These studies are summarised in Appendix 1 of the December 2007 paper entitled *The Prevalence and Severity of Iodine Deficiency in Australia* which was prepared for the Australian Population Health Development Principal Committee of the Australian Health Ministers Advisory Committee.³

These studies collectively suggest that according to international criteria developed by WHO/ICCIDD,⁴ (refer to attachment 2 of the 2007 paper)⁵ the New Zealand population has mild iodine deficiency, with pregnant and breastfeeding women and their breastfed infants being at high risk of moderate iodine deficiency.

¹ <http://www.foodstandards.gov.au/standardsdevelopment/proposals/proposalp230iodinefo2802.cfm>

² Minutes of the Australian Health Ministers Conference, 24 July 2007

³ prepared for the Australian Population Health Development Principal Committee of the Australian Health Ministers Advisory Committee. December 2007, *The Prevalence and severity of iodine deficiency in Australia*

⁴ ICCIDD, UNICEF,WHO. 2001. Assessment of Iodine Deficiency Disorders and Monitoring their elimination. Second edition. Geneva: WHO Publishing.

⁵ n=3

The consequence of iodine deficiency depends on the age and duration of exposure, and, the degree of deficiency, with foetal development and early infancy being particularly critical times.⁶

Implications of mild iodine deficiency

The Prevalence and Severity of Iodine Deficiency in Australia primarily focused on the implications of mild iodine deficiency.⁷ This was because there was a gap in the literature as to the adverse health implications of mild iodine deficiency. An epidemiological review of the evidence for health effects of mild iodine deficiency was therefore undertaken.

This review of mild iodine deficiency was restricted to published papers that were concerned with subjects whose median urinary iodine concentration fell into the range of 50-99 µg/L. The review concluded that the most concerning health consequence of mild iodine deficiency was the deleterious effect on intellectual development.

“The degree of iodine deficiency that results in significant health effects is not easy to define as effects can be subtle at the individual level and are often sub-clinical.”

Implications of moderate iodine deficiency

Moderate iodine deficiency is linked with impaired intellectual development. Two significant meta-analyses have summarized the international literature pointing to a clear association between cognitive development and iodine deficiency.⁸

⁶ Utiger RD. 1999. Maternal Hypothyroidism and Fetal Development. *N Engl J Med*;341:601-602

⁷ prepared for the Australian Population Health Development Principal Committee of the Australian Health Ministers Advisory Committee. December 2007, *'The Prevalence and severity of iodine deficiency in Australia'*.

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1. Qian M, Wang D, Watkins WE, Gebiski V, Yan YQ, Li M, Chen ZP. 2005. The effects of iodine on intelligence in children: a meta-analysis of studies conducted in China. *Asia Pacific Journal of Clinical Nutrition*;14:32-42.

2. Bleichrodt N, Born M. 1994. A Meta-analysis of Research into Iodine and its relationship to cognitive development. 1994. In: Stanbury J ed. *The Damaged Brain of Iodine Deficiency*. New York Communication Corporation: 195-200.

Current Recommended Dietary Intakes (RDIs) and Upper Levels (ULs) of Intake for Iodine

Table 1 Iodine Recommendations by Life Stage and Gender⁹

Population Groups	RDI (µg/day)	UL (µg/day)
1-3 yr	90	200
4-8yr	90	300
9-13yr	120	600
14-18 yr	150	900
Adults (19+ yr) excluding pregnant or breastfeeding women	150	1100
Pregnancy (14-18 yr)	220	900
Pregnancy (19-50yr)	220	1100
Lactation (14-18yr)	270	900
Lactation (19-50yr)	270	1100

Why the most vulnerable are the most at risk of iodine deficiency

Pregnant and breastfeeding women and their infants are at high risk of iodine deficiency. The foetus is particularly vulnerable as it is totally dependent on maternal thyroxine for normal brain development during early pregnancy. Inadequate production of thyroid hormones and hypothyroidism during pregnancy, due to iodine deficiency, can lead to irreversible brain damage. During early infancy iodine deficiency results in thyroid insufficiency which can interfere with neurological development.¹⁰

⁹ National Health and Research Medical Council (NHMRC). 2006. Nutrient reference values for Australia and New Zealand, including recommended dietary intakes. Canberra: Commonwealth of Australia, Wellington: Ministry of Health. <http://www.nrv.gov.au/Nutrients.aspx?code=44588005>

¹⁰ WHO Secretariat on behalf of the participants to the Consultation Andersson M, de Benoist B, Delange F, Zupan J. 2007. Prevention and control of iodine deficiency in pregnant and lactating women and in children less than 2-years-old: conclusions and recommendations of the Technical Consultation. Public Health Nutrition: 10(12A); 1606-1611.

Targeted New Zealand studies of pregnant and breastfeeding mothers and their infants

Four dedicated studies in New Zealand¹¹ indicate that our pregnant and breastfeeding women and their infants are at high risk of mild to moderate iodine deficiency and its attendant complications now. Further, future mandatory fortification is unlikely to sufficiently improve the iodine status of these women or that of their breastfed infants, without additional supplementation.

Table 2 New Zealand studies in pregnant women and infants

Date	Description	# of subjects	Median urinary iodine concentration (UIC)	ICCIDD ¹²	Reference
1991/2	Otago pregnant women	52	52-69 µg/day	Mild to moderate deficiency	Thomson et al 2001a
1998/9	South Isl. 6-24 month infants	230	67 µg/L	Mild deficiency	Skeaff et al 2004
2004/5	Breastfeeding women living in Dunedin with infants 0-6 months	102	42 µg/L	Moderate	Mulrine et al 2005
	Mothers 1 week postpartum; Mothers 24 months postpartum	47; 42	20 µg/L; 34 µg/L		
	Infants 1 week old; Infants 24 weeks old	42; 38	37 µg/L; 47 µg/L	Iodine deficient	
2005	Pregnant women	170	38 µg/L	Moderate deficiency	Pettigrew-Porter et al 2006

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(1) Thomson CD et al. 2001. *Urinary selenium and iodine during pregnancy and lactation*. *Jnl of Trace Elements in Medicine and Biology: Organ of the Society for Minerals and Trace Elements (GMS)* 14:210-217

(2) Skeaff SA et al. 2005. *Are breast-fed infants and toddlers in New Zealand at risk of iodine deficiency?* *Nutrition*; 21: 325-331

(3) Pettigrew et al 2006. *The Thyromobile and iodine pregnancy (TRIP) survey: assessing the iodine status of New Zealand pregnant women*. New Zealand Dietetic Association Conference 11-13 September 2006. Te Papa, Wellington.

(4) Mulrine HM et al 2005. *Iodine status in Dunedin mothers and their breastfed infants*. *Asia Pac J Clin Nutr*; 14 (Suppl): S41

¹² ICCIDD, UNICEF, WHO. 2001 *Assessment of Iodine Deficiency Disorders and Monitoring their Elimination*. Second Edition. Geneva: WHO Publishing.

The 1991/2 study by Thomson et al found mild to moderate deficiency in a group of pregnant women. Skeaff et al in 2004 found the reported mean iodine concentration of a variety of infant formulae available in New Zealand was 95 µg/L, which was more than four times the mean concentration of iodine in breastmilk obtained from 39 breastfeeding women at 22 µg/L. In 2005, the Thyromobile and Iodine in Pregnancy (TRIP) study reported median urinary iodine concentration (UIC) of 38 µg/L and an estimated iodine intake of 48 µg/day in their subjects indicating moderate iodine deficiency.

Practical implications of iodine fortification

Based on Food Standards Australia New Zealand (FSANZ) modelling with a salt iodisation range of 35-55 mg of iodine per kg of salt, pregnant and breastfeeding New Zealand women may increase their iodine intakes in the range of 30-70 µg/day from fortified bread. However, the Ministry understands that the tolerance has been widened to 25-65 mg of iodine per kg of salt, which increases the uncertainty as to what the actual increase of iodine will be in the population's diet.

The mid point for both ranges is 45 mg of iodine per kg of salt and the Ministry understands that the wider range was adopted on advice from salt manufacturers who felt they could comply with the wider tolerance range.

Assuming compliance with the wider iodisation range, mandatory iodine fortification will not sufficiently increase the iodine status of pregnant and breastfeeding women (who eat fortified bread), and that of their breastfed infants. These women will continue to have iodine intakes significantly less than their recommended RDIs. Women who do not eat fortified bread will be at increased risk of iodine deficiency.

Exclusive breastfeeding

The Ministry of Health is promoting exclusive breastfeeding to around six months of age¹³ with a major social marketing campaign scheduled to be launched in late July. This campaign aims to contribute to efforts to increase the number of babies being exclusively breastfed for six months and beyond and the proportion of infants being partially breastfed beyond six months. It will do this by targeting high-needs groups, Māori and Pacific peoples and various settings, including the workplace and Early Childhood Education Centres. District Health Boards are developing local breastfeeding actions and plans across their regions including in the workplace. Despite the irrefutable advantages of breastfeeding, there is a real risk that exclusively breastfed infants in New Zealand may be iodine deficient and, therefore, at risk of neurological impairment.

¹³ Nutrition Guidelines for Healthy Infants and Toddlers (Aged 0-2): A background paper (4th Ed). Wellington: Ministry of Health. 2008.

Dietary Supplements Regulations (DSR 1985) – Australia and New Zealand

The Ministry's interpretation of the current Dietary Supplements Regulations (DSR 1985)¹⁴ is that there is no upper limit for iodine nor is there any requirement for dietary supplement manufacturers to conform to Good Manufacturing Practice (GMP). The New Zealand Food Safety Authority (NZFSA) administers the DSR but the Ministry understands the intention is that around late-2008/early-2009, following an amendment to the DSR, Medsafe will assume responsibility for their administration. The amendment will leave therapeutic-type supplements (including minerals and vitamins) under the DSR but will transfer food-type products out of the DSR and categorise them as supplemented foods, with NZFSA retaining responsibility for their regulation under a food standard.

Medsafe advises that there is no current barrier to Australian supplements being sold in New Zealand providing they comply with the DSR, including for composition and claims. However, the Ministry is unaware that any suitable iodine product is currently on the market in New Zealand.

Attachment 1 lists supplements providing over 50µg/day iodine in Australia prepared by FSANZ in February 2007. Prices will vary but currently a Blackmores product which contains 500µg/day folic acid and 250µg/day iodine is priced at \$A18.95/150 tablet (c\$A0.13/tablet).

However, the entry of any product from Australia containing iodine does concern the Ministry because:

- they are likely to contain other nutrients and not be limited to iodine
- we have no idea, or control over, how they will be priced
- there is potential for confusion on the part of:
 - women planning or in the early stages of pregnancy
 - breastfeeding women
 - health practitioners advising these women as to what they should take and when.

Iodine supplements - Spain

The Ministry understands that in Spain a range of iodine containing tablets are marketed under the brand name Yoduk. There is Yoduk 100, Yoduk 200 and Yoduk Complex. Yoduk Complex contains potassium iodide, folic acid and vitamin B12, and is recommended for the month before conception and the first 3 months of pregnancy. It is then recommended that women switch to the Yoduk 200 tablet for the remainder of their pregnancy and for the duration of breastfeeding. Each tablet contains 200 µg iodine.

¹⁴ http://www.legislation.govt.nz/regulation/public/1985/0208/latest/whole.html?search=qs_regulation_iodine

The Spanish National Health System provides a 50 percent subsidy for these supplements with consumers paying around €4 for 50 tablets for the Yoduk 200 and Complex products (c€0.08/tablet), and €2.59 for Yoduk 100.

Additional limitations of a combination vitamin and mineral tablet

It is important to note that the recommended timeframe for taking a folic acid tablet is very different from that which the Ministry would hope to recommend for iodine.

Specifically for folic acid, the Ministry recommends that women planning pregnancy, or in the early stages of pregnancy, should take an 800 µg folic acid tablet daily for at least four weeks before and 12 weeks after conception as well as consuming foods rich in folate and foods fortified with folic acid.

In contrast, for iodine, the Ministry wants to be able to recommend a subsidised iodine tablet be taken for the duration of pregnancy and breastfeeding but that if any tablet is taken, then the total daily intake of iodine must not exceed the UL of 900-1100 µg/day.

There is also the risk that consumers may take the current 800 µg/day subsidised folic acid tablet in conjunction with a folic acid/iodine combination tablet in an environment where bread (as PTAC knows) is also to be mandatorily fortified with folic acid. This could result in some individuals exceeding the UL for folic acid with unknown consequences.¹⁵

Current supplement use in New Zealand

There is limited information about current supplement use in New Zealand. The most recent adult National Nutrition Survey (1997) found that 51 percent of the New Zealand population (59 percent of females, 42 percent of males) were regular or occasional users of vitamin and/or mineral supplements.¹⁶

Currently in New Zealand, there are a range of supplements available of varying cost and composition which can include iodine. However, the Ministry understands that the only iodine specific tablets are seaweed or kelp. The Ministry does not recommend these because they have variable iodine content which can be high enough to be toxic and they are not required to be made according to GMP.¹⁷

¹⁵ refer to the Ministry's letter to PTAC requesting a reduction in the subsidised folic acid tablet to 400 µg/day dated 12 December 2007.

¹⁶ Russell D, Parnell WR, Wilson N et al. 1999. NZ Food: NZ People. Key results of the 1997 National Nutrition Survey. Wellington: Ministry of Health.

¹⁷ Ministry of Health. 2006. Food and Nutrition Guidelines for Healthy Pregnant and Breastfeeding Women A background paper. Wellington: Ministry of Health.

Current advice to pregnant and breastfeeding women in NZ

The Ministry recommends that *“the iodine tablets currently available in New Zealand are not recommended for pregnant or breastfeeding women. However, if an oral iodine tablet becomes available as a registered medicine, it may be appropriate to recommend this to pregnant or breastfeeding women.”*¹⁸ Hence the supporting policy has been in place for some time waiting for an appropriately subsidised iodine tablet to be either manufactured or sourced, and registered.

Conclusion

Mandatory fortification of bread with iodine will not address the increased metabolic requirements of pregnant and breastfeeding women and their infants in New Zealand, or for those women who choose not to eat fortified bread. With PTAC's assistance the Ministry is hoping to secure a suitable iodine tablet for these women, at no/or low cost.

Options for increasing iodine in pregnant and breastfeeding women

Option 1: Subsidised iodine tablet of at least 150 µg/day iodine

Pharmac to provide a subsidised iodine tablet of at least 150 µg/day suitable for all pregnant and breastfeeding women in New Zealand. This product would be an over the counter registered medicine, of suitable quality which would reduce the risk of iodine deficiency in these women and its attendant complications in their infants. This is the Ministry's preferred option.

Option 2: No subsidised iodine tablet

See if the amendment to the DSR prompts any new products, which contain iodine and conform to GMP, enter New Zealand from Australia, and assess how they are priced. From 2009 at the earliest.

The risk with option 2 is that it's a passive choice which may not eventuate and defers taking a public health stance to provide a suitable iodine tablet for these high risk groups.

Attachment: Tablets providing over 50 µg iodine per day in Australia – prepared by FSANZ February 2007 which the Ministry understands are not subsidised.

¹⁸ Food and Nutrition Guidelines for Healthy Pregnant and Breastfeeding Women: A Background Paper. Ministry of Health: Wellington; 2006.

Attachment 1. Iodine tablet of 50µg/day available in Australia.¹⁹

Brand	Name	µg iodine /tablet	recommended dose/day	µg iodine/ recommended dose
Blackmores	I-Folic	250	1	250
	Kids Chewable Multi	90	1	90
	Men's Performance	50	1	50
	Pregnancy and Breast Gold	125	2	250
	Women's Vitality Multi	120	1	120
	Metabolism Advantage	40	1	40
	Multi Vitamin & Mineral – Sustained Release	100	1	100
Blooms	Kelp Tabs			
Cenovis	Once Daily Women's Multi	150		
	Once Daily men's Multi	150		
	50+ Multi Once Daily	50		
	Pregnancy and Breastfeeding Formula	75	2	150
	Multivitamin and Mineral	150	1-2	150-300
Centrum	Multivitamin and Mineral Adult Formula	100		
	Select 50+	100		
Herb Valley	Kelp	100		
Microgenics	Kelp 1000	200		
	Mega Multivitamin Intense Nutrient Formula	150		
	Men's Essential Multivitamin One a Day Complete Formula (Potassium Iodide)	66		
	Pregnancy Multivitamin with Tuna Oil	100		
	Thermoslim Plus bitter Orange & Green Tea	100		
	Women's Energy with Bitter Orange	100		
	Women's Wellness Multivitamin & Minerals (Potassium Iodide)	92		
Nature's Own	Multivitamin and Mineral	145	1	145
	Orotates and Chelated Minerals	20	4	20
	Deep Sea Kelp	240	1	240
Nature's Way	Men's Energy Multi Vit Tab	50	1	50
Solgar	Formula VM-75 Multivitamins	150		150
	Kelp	100		100
	Formula VM Prime	150		150
	Earth Source	150		150
	Multi II	150		150
	Omnium	150		150

¹⁹ From FSANZ February 2007.