ATTACHMENT 10

SUBSTANTIATED HIGH LEVEL

AND

GENERAL LEVEL HEALTH CLAIMS

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Chapter 1: Selection of Diet Disease Relationships for Review

The following steps were taken in 2004 to develop a short-list of diet-disease relationships for assessment as possible high-level claims in the new health claims Standard:

- A stakeholder workshop was held in Sydney in May 2004 followed by iterative consultation by electronic mail in collaboration with the National Centre of Excellence in Functional Foods.
- Public consultation was undertaken through the P293 Initial Assessment Report.
- The Health Claims Standard Development Advisory Committee considered a short-list of twelve diet-disease relationships.
- The FSANZ Board endorsed a final list of seven diet-disease relationships in December 2004.

A targeted process seeking expressions of interest to review scientific evidence on specific diet and health relationships was sent to academics and research institutions in November 2004. From the expressions of interest received, reviewers were chosen on the basis of submitted credentials, nominated subjects of interest and declared potential conflicts of interest.

To achieve consistency in the approach taken by different experts, FSANZ provided contracted reviewers with an assessment template, copies of appraisals of the relevant diet-disease relationship conducted either by Health Canada or the US Food & Drug Administration, and relevant background information.

Table 10.1: Reviews of scientific evidence commissioned by FSANZ in 2005

Review topic	Reviewer and affiliation/s
Diet disease relationship between sodium (alone or in combination with potassium intake), and risk of developing hypertension.	Assoc Professor Samir Samman School of Molecular and Microbial Biosciences Human Nutrition Unit University of Sydney
Diet disease relationship between calcium, alone or in combination with vitamin D, and risk of developing osteoporosis.	Professor Ian Reid Department of Medicine University of Auckland
Diet-disease relationship between folate and the risk of neural tube defects in the foetus.	Dr Tim Green Elias Green Consultants Dunedin
Diet disease relationship between saturated and trans fatty acids and intake of developing coronary heart disease.	Mr Chris Booker and Professor Jim Mann Otago University
Diet-disease relationship between long chain omega-3 fatty acid intake and risk of developing coronary heart disease.	To be determined
Diet-disease relationship between wholegrains and the risk of developing coronary heart disease	Dr David Topping CSIRO Health Sciences and Nutrition Adelaide
Diet-disease relationship between fruit and vegetables and the risk of developing coronary heart disease or other relevant biomarkers.	Associate Professor Beth Newman School of Public Health Queensland University of Technology

Table 10.2: Short-listed high level claims that were not selected for initial review

Claim	Reason for non-selection	Likely progression
Soluble fibre from certain foods and cholesterol/heart disease	Only a moderate level of interest indicated.	Unlikely to be considered for review later.
Fruits and vegetables and some cancers	A decision by FSANZ on the inclusion of cancer within the serious disease definition was not made at time of selection.	Cancers are considered serious diseases and substantiated cancer claims on foods will be permitted. May be considered for review later.
Soy protein and cholesterol/heart disease	Is not closely linked to the Dietary Guidelines.	Unlikely to be considered for review later.
Sugar alcohols and dental caries	Low level of potential use, and preference indicated.	Unlikely to be considered for review in light of recommended pre-approval of 'tooth friendly' endorsement.
Claims related to obesity	Consideration of obesity as a serious disease was under discussion. There may also be difficulties linking the claim to foods, which necessarily contain energy.	Obesity is considered a serious disease. Unlikely to be considered for review. Consideration has been given to slimming claims.

The Scientific Advisory Group for the Development of the Substantiation Framework for Nutrition, Health and Related Claims (SAG) was convened three times in 2005 to peer review draft reports provided by Contractors. As a general comment, all SAG members considered the commissioned reviews that have been finalised to be of a high quality. Where necessary, the authors have addressed comments and suggestions provided by SAG members and submitted final reviews to FSANZ.

Chapter 2: Outcomes of the Reviews of High Level Claims

Four reviews of diet-health relationships, proposed as the basis for high level claims, have been completed:

- Calcium and bone health.
- Sodium and blood pressure.
- Folates and neural tube defects.
- Saturated and trans unsaturated fatty acids and LDL-cholesterol and coronary heart disease.

The following material presents a summary of the findings of these four reviews. These summaries are intended to cover the key issues identified in the review process. Full reports of these reviews, including full reference lists, will be available on the FSANZ website (www.foodstandards.gov.au).

2.1 Calcium and Bone Health

Review Title:

The Relationship Between Dietary Calcium Intake, Alone or in Association With Vitamin D Status, and Risk of Developing Osteoporosis.

Reviewer:

Professor Ian Reid, University of Auckland.

2.1.1 Osteoporosis and Bone Biology

Bone is a connective tissue consisting of a protein matrix, embedded in a mineral phase made up of calcium and phosphate. During growth and renewal of bone, the bone-forming cells lay down the protein scaffold of bone, which is predominantly type 1 collagen. Secondarily, calcium and phosphate precipitate between the fibres of this matrix, forming hydroxyapatite crystals. The amount of bone at any time in life is determined by the balance between the amount of protein laid down by the bone-forming cells and that which has been removed by the bone resorbing cells.

Severe deficiency of calcium and/or vitamin D results in low circulating levels of calcium, and inadequate mineralisation of bone. This produces the clinical picture of osteomalacia in adults, or rickets in children.

Less severe deficiency of calcium/vitamin D results in increased secretion of parathyroid hormone, which in turn increases bone resorption. This is the mechanism by which suboptimal calcium and vitamin D status accelerate bone loss, particularly in the elderly. Supplementation with calcium and vitamin D has been shown in randomised trials to reverse these processes, with declines in parathyroid hormone and bone resorption, increases in bone density, and decreases in fracture risk.

There is no evidence that calcium directly stimulates bone growth.

Vitamin D is not an important dietary constituent in Australia or New Zealand, virtually all being synthesised in the skin as a result of sunlight exposure.

Various definitions of osteoporosis have been used, including the occurrence of fractures after minimal trauma, and bone density below a specific threshold. Obviously the choice of definition impacts on the degree of certainty that calcium/vitamin D impact on osteoporosis. Bone density is acceptable as a biomarker for osteoporosis.

Changes in biochemical markers of bone turnover indicate an effect on bone metabolism, but generally require bone density or other data for meaningful interpretation. Less direct assessments, such as calcium balance, can be misleading.

2.1.2 Assessment of the Canadian Review

The starting point of the present review was a similar process undertaken in Canada in 2000, reported by L'Abbé (2000). The Health Canada review was used to support the following claim that is now approved for use in Canada:

A healthy diet with adequate calcium and vitamin D, and regular physical activity, help to achieve strong bones and may reduce the risk of osteoporosis.

The assessment of that analysis and the data it reviewed are as follows:

- The Canadian review was a comprehensive summary of the evidence available at the time it was conducted.

- The review gave adequate consideration to the circumstances under which the studies were carried out, but did not acknowledge the weakness of the evidence for anti-fracture efficacy in some of the smaller studies.

- The only adverse effects of high calcium intake that are generally accepted are constipation, and possibly an increased risk of renal calculi in those who use calcium supplements.

- The review did not set out to determine required intakes for either calcium or vitamin D, but rather to address the more general question of whether higher intakes of these compounds would have positive effects on bone health. Randomised controlled trials demonstrate that individuals with baseline intakes of 500–900 mg/day show beneficial changes in bone density when those intakes are increased by a further 500–1000 mg/day. This suggests that a total calcium intake of the order of 1.5 g/day is preferable to one of only 0.5 g/day.

- The importance of the bioavailability of calcium remains uncertain. It seems probable that more soluble calcium sources are more easily absorbed, but the available data are inconsistent.

- The data are not convincing with respect to the effects of phosphate content on bone health. There is concern that high phosphate intakes will act as a stimulus to parathyroid hormone secretion, resulting in accelerated rates of bone loss. However, it has not been possible to demonstrate this consistently. In the absence of persuasive data, it is probably inappropriate for health authorities to make firm statements about the role of phosphate in bone health.

2.1.3 Evidence Published Since the Canadian Review

Four prospective longitudinal studies in children have been published in this period. These studies suggested that calcium intake only accounts for a few percent of the variance in rates of bone gain in children and adolescents taking Western diets.

Ten new randomised controlled trials in children or adolescents were published in this period. Most showed beneficial effects on bone density of about 1%, and these benefits were not sustained after discontinuation of the supplement.

Thirteen new randomised controlled trials in adults were published in this period. Eleven showed beneficial effects on bone density of about 1-2%, and one found a decrease in fracture incidence in postmenopausal women randomised to calcium and vitamin D. Several societies working in the calcium/bone area have published statements supporting higher calcium and vitamin D intakes.

The Cochrane Group has carried out a quantitative meta-analysis of the data for calcium supplementation in postmenopausal women. The conclusions of this were:

Calcium supplementation alone has a small positive effect on bone density. The data show a trend toward reduction in vertebral fractures, but do not meaningfully address the possible effect of calcium on reducing the incidence of non-vertebral fractures.

They excluded studies of combined intervention with calcium and vitamin D from this meta-analysis.

A systematic review of studies in children has recently been published, which reached a more negative conclusion:

Scant evidence supports nutrition guidelines focused specifically on increasing milk or other dairy product intake for promoting child and adolescent bone mineralization.

Despite its negative conclusion, it did report small positive effects of calcium on bone density in randomised controlled trials, though these did not usually persist after the cessation of the intervention.

2.1.4 Relevance to Australia and New Zealand

Serum 25-hydroxyvitamin D concentrations and calcium intakes in the European populations in Australasia are similar to those in North America or Western Europe.

Trials of calcium supplementation in children and adults in Australia and New Zealand have produced similar results to those from North America or Western Europe. Trials in some Asian populations with very low baseline calcium intakes have found more striking treatment effects.
There is no reason to believe that the general conclusions with respect to the effects of calcium and vitamin D supplementation are different between Australia/New Zealand and other Western countries.

2.1.5 Conclusions

The available data are ***convincing*** with respect to the anti-fracture efficacy of calcium/vitamin D combinations in the frail elderly, particularly in women.

The available data are ***convincing*** with respect to the positive effects of calcium supplementation on bone density across a broad age range, particularly in women.

The available data suggest that fractures would ***probably*** be decreased by calcium alone in postmenopausal women.

The available data suggest that it is ***possible*** that high calcium intakes earlier in life may reduce fractures in older people, if that high intake were sustained through into old age.

There is little evidence that a period of several years of dietary calcium intake substantially above current mean levels in children will produce lasting skeletal benefits.

The beneficial effects of calcium supplementation have been demonstrated with a variety of forms of calcium.

The beneficial effects of calcium supplementation have been demonstrated in healthy, unselected girls and women in Australia and New Zealand.

Current evidence suggests that levels of 25-hydroxyvitamin D of at least 50 nmol/L are necessary for optimal bone health.

2.2 Sodium and Blood Pressure

Review Title:

The relationship between dietary sodium intake, alone or in combination with potassium intake, and risk of hypertension in adults.

Reviewer:

Associate Professor Samir Samman, University of Sydney.

2.2.1 Background

Sodium is a mineral that is plentiful in the food supply, either through natural occurrence or through addition of salt (sodium chloride) or sodium-containing food additives. Australians and New Zealanders tend to have dietary sodium intakes that exceed recommended levels. Potassium is also a mineral that occurs naturally and through addition of food additives.

The purpose of this summary is to determine whether or not there is a substantiated relationship between dietary sodium intake, alone or in combination with potassium intake, and risk of hypertension. It does this by critically appraising a recent Canadian government review of the role of sodium and potassium in hypertension and to update this review with reference to Australian and New Zealand circumstances.

2.2.2 Assessment of the Canadian Review

Health Canada reviewed the literature up to 2000 to address the question whether lowering sodium intake in a population will reduce the risk of hypertension. The Canadian document (Johnston, 2000) draws on the US Food and Drug Administration position, published in draft form in 1991 and revised in 1993 (FDA, 1993). The Food and Drug Administration concluded that the effect of change in dietary sodium on blood pressure is small but statistically significant, and acknowledged the impact on those with normal blood pressure (‘normotensives’) and those with elevated blood pressure (‘hypertensives’), the wide variation in response and the existence of salt sensitivity.

The Canadian review has interpreted correctly the US Proposed and Final Rules, and based on new evidence (published between 1993 - 2000) has provided further support for the proposed health claim.

Key evidence summarised in the Canadian review is derived from meta-analyses[1] of the effect on blood pressure of sodium restriction (Graudal et al, 1998; Cutler et al, 1997; Midgely et al, 1996; Swales, 1995) and potassium supplementation (Whelton et al, 1998). The meta-analyses are based on randomised trials, span a range of publication years, combine different numbers of trials in normotensive and hypertensive individuals, and are authored by different research groups. In normotensive individuals, salt restriction is reported to statistically reduce systolic (Graudal et al, 1998; Cutler et al, 1997; Midgely et al, 1996) and diastolic blood pressure (Cutler et al, 1997). In hypertensive individuals, sodium restriction is reported to lower systolic and diastolic blood pressure in all meta-analyses (Graudal et al, 1998; Cutler et al, 1997; Midgely et al, 1996; Swales, 1995). Potassium supplementation (median dose of 75 mmol/d) [2] (Whelton et al, 1998) was associated with a significant reduction in mean systolic (-3.11 mm Hg) and diastolic (-1.97 mm Hg) blood pressure and the effect is greater in studies with a reported higher level of urinary sodium excretion.

Potential undesirable effects of sodium restriction are considered in the Canadian report. Adverse effects are based on four experimental studies and one meta-analysis that report increased mortality, increased plasma rennin and aldostreone, noradrenalin, and cholesterol. In addition fatigue and impaired sexual function were more frequently reported on a low sodium diet than on a normal diet or a weight-reducing diet in hypertensive men. The limitations of these reports are also discussed.

The Canadian review presents convincing evidence that salt restriction in the normotensive population results in small (1.2 mmHg) reductions in systolic blood pressure for a large (100 mmol/day or about 6 g salt) reduction in sodium intake over the short term. The effect in hypertensive individuals, for an equivalent reduction in sodium, is 4/2 mmHg reduction in systolic/diastolic blood pressure.

The risk of cardiovascular disease rises with blood pressure throughout the normotensive blood pressure range (MacMahon et al, 1990) and almost 60% of coronary heart disease events and 45-50% of strokes occur in those with high normal blood pressure. Hence, persons with normal blood pressure may also benefit from lifestyle modification. The review supports two diet-disease relationships.

The first identifies sodium as the primary factor in affecting blood pressure, and acknowledges a range of other factors that include potassium. The second relationship identifies body mass index (BMI, kg/m^2) as the major factor and acknowledges the multifactorial nature of hypertension.

[1] Meta-analyses are studies that combine results from several studies and summarise the findings quantitatively.

[2] The average diet provides about 100 mmol/day and common vegetables contain 5-9 mmol/100g.

2.2.3 Evidence published since the Canadian review

A search of the literature was undertaken by using MEDLINE, Cochrane and related databases, to update the Canadian review to 2005.

Cross-sectional studies that consisted of large sample size, have been carried out in diverse populations [UK, EPIC-Norfolk (Khaw et al, 2004); INTERMAP, China (Zhao et al, 2004), USA (Stamler et al, 2003); NHANES, USA (Hajjar et al, 2001, 2003). Evaluation of the NHANES-III data showed that systolic blood pressure was positively associated with higher sodium and protein intakes ($P<0.05$) and negatively associated with potassium intake ($P=0.003$). Diastolic blood pressure was negatively associated with potassium and alcohol intakes ($P<0.001$). These large cross-sectional studies support the positive association between sodium intake and blood pressure, and identify socioeconomic, physiological and dietary factors that modify it. The outcomes of these studies point further to the involvement of sodium in addition to other nutrients, such as potassium and calcium, in affecting blood pressure.

Experimental studies

Experimental studies are those where there is some form of intervention in the diet or lifestyle of participants in order to address a research question, and include randomised and non-randomised, blinded and non-blinded clinical trials. Experimental studies are generally the most persuasive in determining whether or not a diet-disease relationship exists.

In a three-year study of salt restriction, the Trials of Hypertension Prevention, Phase II, participants had a decrease in systolic blood pressure (1.3 mmHg, $P=0.02$) that corresponded with a significant dose-dependent reduction in sodium excretion (Kumanyika et al, 2005; Cook et al, 2005). In a seven-year follow-up of participants in Trials of Hypertension Prevention, Phase I, the effect of sodium reduction on blood pressure was not significant, however weight loss resulted in a reduction in the Odds Ratio for hypertension ($P<0.02$) (He et al, 2000).

The effects on blood pressure of three levels of dietary sodium (65, 107 and142 mmol/d) with the DASH diet (rich in fruit and vegetables, and low-fat dairy products) or a typical American (control) diet, were investigated (Svetkey et al, 2004; Bray et al, 2004; Sacks et al, 2001; Vollmer et al, 2001). Sodium restriction over 30 days, in addition to the DASH diet, produced a reduction in systolic blood pressure that was commensurate with the extent of sodium restriction (Bray et al, 2004; Sacks et al, 2001; Vollmer et al, 2001). The DASH-sodium diet led to a mean reduction in systolic blood pressure of 7.1 and 11.5 mm Hg in normotensive and hypertensive individuals, respectively (Vollmer et al, 2001) and the effect was more pronounced in older compared to younger individuals (Bray et al, 2004; Vollmer et al, 2001). In elderly participants, sodium restriction resulted in mean reductions of 4.3 mmHg ($P<0.001$) and 2.0 mmHg ($P=0.001$) in systolic and diastolic blood pressure, respectively (Svetkey et al, 2004).

In an Australian community setting, Nowson et al. (2003,2004) examined the effect of dietary intervention on blood pressure. In the context of a self-selected high potassium (80 mmol) diet, a low sodium (50 mmol/d) diet consumed for 4 weeks reduced home-measured systolic blood pressure (- 2.5 mm Hg, $P=0.004$), compared with the higher sodium (120 mmol/d) diet (Nowson et al, 2004).

Further intervention showed that a low-sodium, high-potassium diet resulted in greater falls in systolic and diastolic blood pressures (-3.5 and -1.9 mmHg, respectively) when compared to a DASH-type diet (Appel et al, 2001).

The effect of multiple lifestyle intervention that includes the combination of sodium restriction, the DASH diet, weight loss and regular aerobic exercise was evaluated in the DEW-IT study. After 9 weeks, systolic and diastolic blood pressures were decreased by 12.1 mm Hg ($P<0.001$) and 6.6 mm Hg ($P<0.001$), respectively in the intervention participants compared with those in the control group (Miller et al, 2002). In individuals with above optimal blood pressure, the PREMIER trial showed that patients in the 'established recommendations' or 'established + DASH diet' intervention groups had significant weight loss and reduction in sodium intake; both groups achieved greater reductions in systolic and diastolic blood pressure than did patients in the 'advice only' group (Svetkey et al, 2005; McGuire et al, 2004; Appel et al, 2001).

The findings of the intervention studies provide convincing evidence for the effect of sodium restriction on blood pressure reduction and for the involvement of multiple factors in the aetiology of hypertension.

Experimental studies – salt sensitivity

In healthy volunteers followed-up over 2 years, a significant correlation ($P<0.05$) between sodium intake and systolic and diastolic blood pressure was observed in 16% and 5% of participants, respectively (Ducher et al, 2003). The authors conclude that 5-16% of healthy individuals have 'salt-dependent blood pressure' and may benefit from a reduction in salt intake. In hypertensive individuals, salt sensitivity is predicted significantly by age and is related to gender, with highest sensitivity in women with low-renin hypertension and in men with non-modulator hypertension (Hurwitz et al, 2003). In the DASH-sodium trial, blood pressure measurements varied significantly over time even when measured by highly trained staff. The authors propose that current study designs that are used to determine whether individuals are salt sensitive, may lead to false positives (Obarzanek et al, 2003).

Reviews, meta-analyses

Hooper et al (2005, 2002) reviewed the literature to assess the long-term effects of advice to restrict dietary sodium in adults. The systematic review (Hooper et al, 2002) included randomised controlled trials that aimed to reduce sodium intake over at least 6 months. In normotensives (3 trials, n=2326), untreated hypertensives (5 trials, n=387), and in people being treated for hypertension (3 trials, n=801) blood pressures were reduced (systolic by 1.1 mm Hg; diastolic by 0.6 mm Hg) at 13-60 months, as was urinary 24h sodium excretion (by 35.5 mmol/d) in those allocated to low sodium advice. The extent of reduction in sodium intake and change in blood pressure were not related. The authors conclude that intensive interventions provide only small reductions in blood pressure and sodium excretion, and effects on deaths and cardiovascular events are unclear.

The report of Hooper et al. (2002) has been criticised (MacGregor et al, 2003; Law and Wald, 2003; Perry et al, 2003) for not providing details about what advice was offered to trial participants and for including studies that do not provide reduced salt foods.

While the effect of avoiding discretionary salt is small, Law and Wald (2003) claim that the effect of salt reduction as reported by Hooper et al. (2002) will have been underestimated because the trial participants included people who had already taken steps to avoid using discretionary salt, thereby diluting the observed effect on blood pressure. In addition, the discussion section of the paper by Hooper et al has been criticised because it is selective, and the arguments are said to be largely based on a simplistic, individually based model of health promotion (Perry et al, 2003).

He and MacGregor (2002, 2003, 2005) investigated the effect on blood pressure of reduction in salt intake over $\geq$ 4 weeks. In individuals with elevated blood pressure (17 trials, n=734) the median reduction in urinary sodium excretion was 78 mmol/d and the mean reduction in systolic and diastolic blood pressure was -4.97 mmHg and -2.74 mmHg, respectively. In individuals with normal blood pressure (11 trials, n=2220) the median reduction in urinary sodium excretion was 74 mmol/d and the mean reduction in systolic and diastolic blood pressure was -2.03 mmHg and -0.99 mmHg, respectively. Weighted linear regression analyses showed a correlation between the reduction in urinary sodium and the reduction in blood pressure (He and MacGregor, 2005).

Geleijnse et al. (2003) evaluated the blood pressure response to sodium reduction (40 trials) and potassium supplementation (27 trials) in trials lasting more than 2 weeks. Sodium reduction (-77 mmol/d) was associated with changes of -2.54 mmHg and -1.96 mmHg in systolic and diastolic blood pressure, respectively. Corresponding values for increased potassium intake (44 mmol/d) were -2.42 mmHg and -1.57 mmHg. The blood pressure response was larger in hypertensives than normotensives, both for sodium restriction (systolic: -5.24 vs -1.26 mmHg, $P < 0.001$; diastolic: -3.69 vs -1.14 mmHg, $P < 0.001$) and potassium supplementation (systolic: -3.51 vs -0.97 mmHg, P=0.089; diastolic: -2.51 vs -0.34 mmHg, P=0.074).

Jurgens and Graudal (2005) determined the effects of low- versus high-sodium intake on blood pressure, plasma or serum levels of renin, aldosterone, catecholamines, cholesterol and triglycerides. The authors estimate that in Caucasians with normal blood pressure (57 trials), low sodium intake lowered systolic (-1.27 mmHg, P<0.0001) and diastolic (-0.54 mm Hg, P=0.009) blood pressure as compared to high sodium intake. In 58 trials of mainly Caucasians with elevated blood pressure, low sodium intake reduced systolic (-4.18 mmHg, P<0.0001) and diastolic (-1.98 mmHg, P<0.0001) blood pressure as compared to high sodium intake. The median duration of the intervention was 8 days in the normal blood pressure trials (range 4-1100) and 28 days in the elevated blood pressure trials (range 4-365). It is noteworthy that multiple regression analyses showed no independent effect of duration on the effect size. In eight trials in black participants, low sodium intake reduced systolic (-6.44 mm Hg, P<0.0001) and diastolic (-1.98 mm Hg, P=0.16) blood pressure as compared to high sodium intake. There were also significant increases in plasma or serum renin (304%), aldosterone (322%), noradrenalin (30%), cholesterol (5.4%), Low Density Lipoprotein cholesterol (4.6%), adrenaline (12%) and triglycerides (5.9%) with low- as compared with high-sodium intake.

2.2.4 Relevance to Australia and New Zealand

The trial settings and outcomes of the cited studies are applicable to Australia and New Zealand although the inclusion of data from trials with African-Americans may overestimate, to a small degree, the sodium-blood pressure relationship in hypertensive individuals [52].

In an Australian community setting, Nowson et al. (2003, 2004) examined the effect of dietary intervention on blood pressure. In the context of a self-selected high potassium (80 mmol) diet, a low sodium (50 mmol/d) diet consumed for 4 weeks reduced home-measured systolic blood pressure (- 2.5 mm Hg, P=0.004), compared with the higher sodium (120 mmol/d) diet (Nowson et al, 2003). Further intervention showed that a low-sodium, high-potassium diet resulted in greater falls in systolic and diastolic blood pressures (-3.5 and -1.9 mmHg, respectively) when compared to a DASH-type diet (Nowson et al, 2004).

A Medline search that utilises using a number of strategies including key words and combinations of 'blood pressure', 'salt sensitivity', 'Australia', 'New Zealand' or 'Oceanic ancestry group' did not reveal any articles of studies on indigenous populations, relevant to this review.

2.2.5 Conclusion

The studies that have appeared since 2000 provide ***convincing*** evidence for the relationship between sodium intake and blood pressure. Further, these studies support the findings of the Canadian review, namely that sodium restriction has a favourable but small effect on blood pressure reduction. As noted in the Canadian review, researchers remain divided about the potential benefits to public health of implementing widespread programs to lower sodium intake.

Cross-sectional studies have been carried out in diverse populations (Khaw et al, 2004; Zhao et al, 2004; Stamler et al, 2003; Hajjar et al, 2001; Hajjar and Kotchen, 2003) and their outcomes identify the involvement of sodium in addition to other nutrients, such as potassium and calcium, in affecting blood pressure. Prospective studies indicate that a reduction in sodium excretion (Tuomilehto et al, 2004) or blood pressure (Froom and Goldbourt, 2004) reduced cardiovascular endpoints, however in intervention trials there is no clear effect of sodium restriction on deaths or cardiovascular events (Hooper et al, 2005).

A number of trials have been published that report on the effects of sodium restriction in addition to dietary and lifestyle factors, on blood pressure reduction. The findings provide further ***convincing*** evidence for the sodium-blood pressure relationship and for the involvement of multiple factors in the prevention or management of hypertension. The outcomes of the intervention trials as summarised in systematic reviews (Hooper et al, 2005; Jurgens and Graudal, 2005; He and MacGregor, 2002), demonstrate a small but statistically significant effect of sodium restriction on blood pressure. In interventions lasting more than 6 months, sodium restriction by 35 mmol/day results in a reduction in systolic/diastolic blood pressure of -1.1/-0.6 mmHg (Hooper et al, 2005). In short-term trials (>4 weeks), a decrease in sodium excretion corresponds to systolic/diastolic blood pressure reductions of -2.09/-0.99 and -4.97/-2.74 in normotensive and hypertensive populations, respectively (He and MacGregor, 2005).

When short-term trials that include mainly Caucasians are analysed, the observed effect of sodium reduction on systolic/diastolic blood pressure is -1.27/-0.54 and -4.18/-1.98 in normotensive and hypertensive participants, respectively (Jurgens and Graudal, 2005).

The trial settings and outcomes are applicable to Australia and New Zealand although the inclusion of data from trials with African-Americans may overestimate, to a small degree, the sodium-blood pressure relationship in hypertensive individuals (Jurgens and Graudal, 2005).

The evidence available since 2000 is ***convincing*** and further supports the conclusion of the Canadian review that 'moderation in intake of sodium may reduce the risk of high blood pressure, a condition associated with many factors including overweight, excessive alcohol consumption, inadequate intake of dietary potassium, and inactivity'.

2.3 Folates and neural tube defects

Review Title:

The relationship between dietary folate intake of women of child-bearing age and risk of neural tube defects in the foetus.

Reviewer:

Dr Tim Green, University of Otago.

2.3.1 Background

Folate is a water-soluble B vitamin that occurs naturally in food. Folic acid is a synthetic form of folate. Because of its high stability and bioavailability folic acid is the form of folate that is used in supplements and added to fortified foods.

Folate helps produce and maintain new cells and is, therefore, important during periods of rapid growth such as pregnancy. Neural tube defects, serious birth defects that occur around 28 days post-conception, result in malformations of the brain (anencephaly) and spine (spina bifida). Infants with anencephaly die at birth or soon after and those with spina bifida are often afflicted with varying degrees of paralysis and disability. Over 30 years ago it was first suggested that folic acid taken peri-conceptionally could reduce a woman's chance of having a neural tube defect-affected pregnancy.

The term Dietary Folate Equivalent (DFE) is a means of expressing the relative bioavailability of natural folates compared to folic acid.

$$1\ \text{DFE}\ (\mu g) = 1 \times \text{natural folates}\ (\mu g) + 1.7 \times \text{folic acid}\ (\mu g)$$

A daily intake of 400 µg folic acid would be equivalent to 680µg DFE.

2.3.2 Assessment of the Canadian Review

This FSANZ review was prepared drawing on an existing, unpublished, review prepared by Health Canada in 2000 (Health Canada, 2000). The Health Canada review supported the scientific link between folate and neural tube defect risk reduction.

The Canadian summary is a reasonable starting point for the substantiation of a relationship in the Australian/New Zealand context between dietary folate and risk of neural tube defects. There is now convincing evidence that folic acid taken prior to, and during the first month of, pregnancy can reduce a woman's risk of having a neural tube defect-affected pregnancy. No fewer than 15 cross-sectional and case-control studies have examined this relationship and nearly all have been supportive. The most convincing evidence comes from three randomised controlled trials and a public health campaign conducted in China.

In one study, peri-conceptional folic acid taken alone (4 mg) or as part of a multi-vitamin reduced the risk of neural tube defects by 72% in women with a prior neural tube defect-affected pregnancy. In another study of primary neural tube defect prevention there were no cases of neural tube defects in women receiving folic acid (800 μg) as part of a multivitamin supplement and six cases in women receiving a placebo. In a population based prevention campaign in China, risk of an affected pregnancy was reduced by 80% in women taking 400 μg folic acid in a northern province of China.

Although there is now convincing evidence that folate lowers neural tube defect risk we are no closer at saying how folate prevents neural tube defects. Most women who have a neural tube defect-affected pregnancy are not folate deficient. It has been suggested that additional folic acid during the peri-conceptional period helps overcome some metabolic block in genetically sensitive women.

Improved folate status during the peri-conceptional period will not prevent all neural tube defects. Nevertheless, folic acid taken during the peri-conceptional period has been shown to be effective against neural tube defects in a wide range of populations and study designs.

The strength of evidence indicating that natural folate is protective against neural tube defects is possible at best. Further, issues of bioavailability, stability, and measurement of natural folate make it is impossible to indicate the dose, if any, of natural folate required to prevent neural tube defects.

Consideration should be given to amount of folic acid a food should contain to be allowed to carry the claim. The minimum amount of folate required to prevent neural tube defects is not known with any certainty. The lowest dose of folic acid demonstrated to be effective in an intervention trial is 400 μg/day. However, based on changes in red cell folate doses of folic acid as low as 100-200 μg folic acid per day consumed chronically may confer some protection. A woman would have to eat five or ten servings of a fortified food containing 40 μg folic acid per serve[3] to achieve folic acid intakes of 200 and 400 μg, respectively.

2.3.3 Evidence Published Since the Canadian Review

In view of evidence released since the time of the Health Canada review, the relationship between folic acid, either as supplements or folic acid fortified foods, and protection against neural tube defects remains ***convincing***. The findings of a reduced prevalence of neural tube defects post- mandatory fortification in the United States supports the notion that folic acid-containing foods are effective against neural tube defects and that folic acid at doses less than 400 μg/day is also effective. The finding of a smaller reduction in neural tube defects post-fortification in the US versus Newfoundland, Canada confirms the findings of the study in China indicating that the effect of folic acid on neural tube defect reduction will be diminished in areas with a low background incidence.

There is no new evidence to support a protective role for natural folate against neural tube defects and this evidence suggesting a relationship remains '***possible***' at best.

[3] Under Standard 1.1A.2 Transitional Standard – Health Claims, a food carrying a folate-neural tube defect health claim must contain at least 40 μg folate per serve.

2.3.4 Relevance to Australia and New Zealand

There is no reason to expect that increasing folic acid intake peri-conceptionally would not be effective against neural tube defects in Australia and New Zealand. Neural tube defect rates are low in Australia and New Zealand. Accordingly, the magnitude of reduction in neural tube defects with folic acid may be diminished.

2.3.5 Conclusions

Folic acid supplements are protective against neural tube defects. The relationship is well substantiated and ***convincing***. Folic acid added to food is highly bioavailable. Folic acid fortified foods will be effective against neural tube defects.

There is little evidence available on the relationship between natural folate intake and neural tube defects and therefore there is little evidence to support natural folate as being protective against neural tube defects in the same manner as folic acid.

Folic acid should lower neural tube defect rates in Australia and New Zealand but the reduction may not be as great as reported in the studies that established the relationship.

400 μg folic acid is the minimum amount of folic acid shown to be effective in an intervention. 100-200 μg folic acid consumed chronically should confer some protection against neural tube defects.

2.4 Saturated and *Trans* Unsaturated Fatty Acids and LDL-Cholesterol and Coronary Heart Disease

Review title:

The relationship between saturated and *trans* unsaturated fatty acids and LDL-cholesterol and coronary heart disease.

Reviewers:

Mr Chris Booker and Professor Jim Mann, Edgar National Centre for Diabetes Research, Departments of Medicine and Human Nutrition, University of Otago.

2.4.1 Introduction

Coronary heart disease (CHD) mortality rates have fallen during the last several decades, but it remains a major cause of serious illness and death in adults in Australia and New Zealand. The underlying pathology in most cases is atherosclerosis, which involves an accumulation of lipoproteins, platelets, monocytes, endothelial cells, and smooth muscle cells in the walls of arteries, following damage to the layer of cells lining the artery. Atherosclerosis results in narrowing of the arteries and consequently reduction in the blood supply to heart muscle. A clot or thrombus may be superimposed on the atherosclerotic lesions, leading to a total obstruction to the blood supply and consequently death of the section of heart muscle supplied by the artery. This process leads to coronary thrombosis or myocardial infarction, whereas reduction of the blood supply leads to angina. The pathology is believed to result from an interaction between genetic and environmental factors.

However, it is noteworthy that cholesterol derived principally from low-density lipoproteins is an important constituent of the atherosclerotic plaque, and total and LDL cholesterol are the most clearly established of the many potentially modifiable risk factors for CHD.

LDL cholesterol is the major contributor to total blood cholesterol, hence total cholesterol is often used as a surrogate for LDL cholesterol since it is more easily measured. A clear dose response effect is apparent for total cholesterol in prospective epidemiological studies examining determinants of CHD, and CHD is extremely uncommon in populations with low mean cholesterol levels. Randomised controlled clinical trials have shown a benefit in terms of CHD risk reduction that is proportional to the reduction in cholesterol levels, regardless of whether this is achieved by drug therapy or dietary modification. Thus, LDL cholesterol is the most convincing of the biomarkers for CHD and it is generally accepted that measures able to reduce LDL cholesterol will reduce CHD risk.

2.4.2 Critical appraisal of the Canadian Review

The starting point for the present review was a similar process undertaken in Canada in 2000 by Ratnayake and McDonald. The Canadian review updated a 1993 United States report and reaffirmed the observation, first made in the 1950's, that saturated fatty acids were important determinants of total and LDL cholesterol. The Canadian review evaluated the scientific literature published between 1993-1999. It provides a comprehensive and reasonably accurate summary of the evidence available at the time it was conducted. Some limitations of the Canadian review are described, however, these do not appreciably influence the overall conclusions. In summary, the authors' consideration of the validity of the Canadian review's conclusions is as follows:

- There is no doubt that the influence of total fat and cholesterol intakes on serum LDL-cholesterol and coronary heart disease are less important than the effects of saturated and *trans* fatty acids. In terms of both LDL cholesterol and coronary heart disease, there is no evidence that reducing total fat intake confers benefit beyond that resulting from the reduction in saturated fatty acids. That dietary cholesterol has a less marked effect than saturated fatty acids or total (and LDL) cholesterol has been repeatedly demonstrated since the 1960's. More recent studies have shown that even with intakes of dietary cholesterol which are appreciably greater than those typically consumed, the effect on LDL cholesterol is relatively small when intakes of saturated fatty acids is low. There is some evidence to suggest that the effect of dietary cholesterol is greater in individuals with apoE4E4 or apoE3E4 genotypes than those with other apoE genotypes and amongst those with relatively high levels of total and LDL cholesterol. However these observations do not influence the overall conclusion. There is little evidence in epidemiological studies of a meaningful association between intake of dietary cholesterol within the usual range of intakes and clinical coronary heart disease.

- The report does not consider potential undesirable effects associated with the expected dietary change. However there are no specific nutritional requirements for vegetable sources of *trans* unsaturated fat principally produced in the manufacturing process and only benefits, not undesirable effects, would be expected to accrue from their elimination from the diet were this feasible. Many saturated fats on the other hand contribute to total energy intake and are also sources of other important nutrients, notably fat-soluble vitamins.

However, other than in the first few years of life, when substantial fat restriction may lead to inadequate energy intakes for growth and development, even substantial reductions of saturated fatty acids will not lead to energy deficits (if required *cis* unsaturated fatty acids may compensate) or deficiencies in fat soluble vitamins.

- We believe that there is convincing evidence for a causal link between saturated and *trans* unsaturated fatty acids and LDL cholesterol. Benefit in terms of reduced risk of coronary heart disease is likely to accrue from reduced intakes. However it is still somewhat open to question as to whether the evidence directly linking saturated fatty acid intake with coronary heart disease can be described as 'convincing' using current criteria or whether it should more appropriately be described as 'probable'.

- The Canadian review is comprehensive and builds appropriately on earlier literature. Thus it is a reasonable starting point for the substantiation of a relationship between saturated and *trans* unsaturated fatty acid intake and LDL cholesterol and coronary heart disease. Although the effects of the different saturated fatty acids are not equal we acknowledge that in terms of recommendations or claims it is inappropriate and indeed probably impossible to distinguish between the different saturated fatty acids.

2.4.3 Review of evidence released since the publication of the Health Canada report

A literature search was carried out on the OVID Medline 1999 to June Week 4 2005 database. Results were limited to articles in the English language, giving a total of 1,937 articles.

Saturated fatty acids

The results of studies published since publication of the Health Canada review are generally supportive of the conclusion arrived at in that report – that increasing intake of saturated fat is convincingly associated with raised LDL cholesterol. The main development since the Health Canada report appears to be an increasing sophistication of analysis based on larger pools of data with additional examination of the effects of individual saturated fatty acids.

In addition to the further dietary intervention trials in adults, several recent randomised controlled trials have examined saturated fat intake in childhood following randomisation to low-fat or control diets. These studies suggest that reduction of saturated fat intake even very early in childhood has the potential to reduce LDL cholesterol levels and improve cardiovascular risk factors, with none reporting adverse effects on child growth and development as a result of fat restriction. Long-term compliance may be difficult to sustain. It appears that saturated fat reduction in young children may only produce these beneficial effects on lipid levels in boys and not girls, with no clear explanation regarding gender differences.

Two important meta-analyses have aggregated data for the dietary intervention trials (Mensink et al., 2003; Müller et al., 2001). When considering the effect on LDL or the ratio of LDL:HDL there is no doubt that the most marked adverse effects are associated with myristic and palmitic acids. While lauric acid is certainly associated with an elevation of LDL cholesterol there is less consistency with regard to the relative effects of this fatty acid compared with myristic and palmitic acids. However while all three of these fatty acids are associated with increase in HDL cholesterol when compared with carbohydrate, the effect of lauric acid is consistently the greatest.

This may to some extent mitigate the effects of LDL elevation. Although stearic acid has no effect on LDL cholesterol, there is no doubt that in aggregate saturated fatty acids are 'convincingly' associated with LDL elevation. In terms of substantiating a health claim, the relative effects of the individual fatty acids are not of public health importance.

No new prospective studies of saturated fat intake and health outcomes were identified. However further analyses of the Nurses' Health Study, Seven Countries Study, the British Health and Lifestyle Survey, and a cohort of Danish men and women have been undertaken. They are generally confirmatory of an association between saturated fat intake and coronary heart disease. However discrepancies do exist and these are partially explicable. An analysis of the Nurses' Health Study cohort from 1980 to 1998 showed no significant association between saturated fat intake and coronary heart disease. The authors ascribe this weakening of the previously observed associations in this cohort to reductions in intakes of saturated fat and incidence of coronary heart disease which occurred during the 18 years subsequent to the establishment of the cohort and recording of baseline data. Data from the British Health and Lifestyle Survey showed a significant association between intake of saturated fat and coronary heart disease amongst women, with a stronger association observed amongst older women.

A 16-year follow up of Danish men and women reported an association of borderline significance between saturated fat intake and coronary heart disease in women, which was observed to be stronger amongst younger women. Both the British Health and Lifestyle Survey and the Danish cohort study showed no association of saturated fat intake and coronary heart disease in men. The prolonged period between the baseline dietary data and morbidity and mortality from coronary heart disease to which intake of saturated fatty acid was related is a likely explanation for the failure to confirm the associations convincingly demonstrated during the earlier follow up period. However inconsistencies with regard to gender and age are not readily explained.

Thus while there is a considerable body of evidence to suggest that saturated fatty acids are indeed associated with coronary heart disease and there is indeed a biologically plausible explanation, the heterogeneity observed in the recent analyses which cannot be fully explained lead to the conclusion that the association is 'probably' causal rather than 'convincingly' causal.

Trans fatty acids

There has been much debate regarding the link between dietary TFA and adverse health outcomes since the time of the Health Canada report. Numerous editorials, comments and reviews were retrieved while searching the evidence published since 1999.

Numerous dietary intervention and metabolic studies published between 2000 and 2005 on the effects of dietary *trans* fatty acids support their role in increasing LDL cholesterol. While there is still some uncertainty as to whether this increase is more, less or equal to that of saturated fat, the association between intakes of *trans* fatty acids and LDL cholesterol is unquestionably 'convincing'. In addition, while some studies covered in the time period under review showed no significant effect of dietary *trans* fatty acids on HDL cholesterol levels, the majority document a decrease in HDL cholesterol when *trans* fatty acids replace dietary carbohydrate, and meta-analyses confirm a more adverse effect on overall lipoprotein profile (LDL:HDL ratio) than that conferred by saturated fatty acids.

For the purposes of substantiation of a health claim the much debated issue regarding the relative adverse effects of *trans* and saturated fatty acids on LDL cholesterol is of little relevance.

Two cross-sectional studies examining dietary *trans* fatty acids and LDL cholesterol have been published during the period 2000 – 2005; one carried out in Costa Rica, the other a multinational European collaboration, the TRANSFAIR study. The Costa Rican study found no evidence for an association between *trans* fatty acid intake and LDL cholesterol. The TRANSFAIR study however reported an inverse relationship between total *trans* fatty acid intake and LDL cholesterol levels, with differing effects for different *trans* isomers: t18:1 and t18:2 were inversely associated with LDL cholesterol levels, while t14:1 (n-9) and t22:1 showed a positive association. It is noteworthy that the mean intakes of *trans* fatty acids reported in both of these studies were very low, with *trans* fatty acids contributing less than 1% of total energy. It is conceivable that there may be a threshold effect whereby low levels of *trans* fatty acid intake do not affect lipid levels as do higher intakes. However regardless of the explanation of these findings, such cross-sectional studies do not negate the findings of the more powerful intervention studies.

Recent evidence from the major prospective cohorts the Nurses' Health Study and Zutphen Cohort study show a clear link between dietary *trans* fatty acid intake and incidence of fatal and nonfatal cardiovascular disease. The report from the Zutphen Cohort Study also examined the pooled effect of dietary *trans* fatty acids from these two studies and the previously published Health Professional's Study and Alpha-Tocopherol Beta-Carotene Cancer Prevention Study. There is also a clear positive association between dietary *trans* fatty acids and cardiovascular disease across these four large cohort studies, with evidence for a dose response relationship.

Two case control studies considered in the report from Health Canada found no association between adipose *trans* fatty acids and incidence of myocardial infarction or sudden cardiac death (Roberts et al., 1995; Aro et al., 1995). In contrast three similar studies reported since 2000 have reported a clear association of increased risk of nonfatal or fatal myocardial infarction with increasing dietary intakes or adipose tissue content of *trans* fatty acids. The authors of three recent studies offer no explanation for this disparity, nor indeed could we find a definitive one. It should be noted that in the EURAMIC study (Aro et al., 1995) a trend towards a positive association between adipose *trans* fatty acids and acute myocardial infarction was present after exclusion of two outlying centres with low adipose *trans* fatty acid levels. The study by Roberts *et al*. is the only one considered here, and in the Health Canada report, to examine the link between adipose tissue *trans* fatty acids and sudden cardiac death.

Thus samples from cases were taken during post-mortem examinations (median time of 24 hours after death) rather than from survivors of first acute MI. Furthermore samples were collected from the anterior abdominal wall and not from abdomen or buttock tissue aspirates as in other similar studies. Whether these differences in methodology could account for the differences in results is unknown.

Despite the strength of the evidence from the cohort studies the heterogeneity in the data suggest that at the present time it may be more appropriate to describe the association between trans fatty acids and coronary heart disease as 'probable' rather than 'convincing'.

2.4.4 Relevance to Australia and New Zealand

Information on population intakes of saturated fat, and food sources of saturated fat such as meat and dairy products, is readily available in both countries from National Nutrition Surveys conducted at fairly regular intervals. Information on *trans* fatty acid intakes is sparse. Whilst the respective National Nutrition Surveys of Australia and New Zealand include data on the intakes of industrially produced foodstuffs, such as margarines, and meat from ruminant animals, which are common sources of dietary *trans* fatty acids, there have been few attempts to derive estimated intakes of *trans* fatty acids from these.

Data on saturated fat intake from the most recent Australian Nutrition Survey (McLennan and Podger, 1995a + b), which is now a decade old, indicated a mean saturated fat intake for males aged 19 yrs and over of 39.0 g/day or 12.7 % total energy, and 26.7 g/day or 12.7% total energy for females aged 19 yrs and over. Data from the latest New Zealand Nutrition Survey regarding saturated fat intake are also somewhat out of date, the survey having been conducted in 1996/97 (Russell et al., 1999). Mean intake of saturated fat was 15% of total energy for both males and females and similar across ages. Thus it appears that amongst the populations of Australia and New Zealand there exists a fairly substantial potential for reduction of saturated fat intake.

Apart from the estimates of Clifton et al. and Mansour et al. the most recent estimates on intakes of trans fatty acids in Australia were noted to have been published in 1994 from simulated Australian diets or based on food frequency questionnaire data collected in 1987, and for New Zealand from the 1989/1990 Life In New Zealand (LINZ) survey. Mean *trans* fatty acid intakes from simulated Australian diets were calculated to range from 6.4 g/day or 2.5 % total energy for males and 4.4 g/day or 2.1 % total energy for females, to 13.6 g/day or 5.3 % total energy for males and 10.5 g/day or 5.1 % total energy for females, based on different assumptions about the *trans* fatty acid content of available foods. The authors conclude that intakes 'are likely to be less than 2 – 2.5 % energy' (Noakes and Nestel, 1994). Data from the LINZ survey suggest intakes in New Zealand to be slightly less at 5.4 g/day for males and 3.4 g/day for females. These figures equate to 1.9 % total energy for both sexes. Thus although current intakes may not be excessive it is necessary to ensure that levels do not increase and indeed benefit may accrue from reduction to even lower levels.

2.4.5 Conclusions

The starting point for the present review was a similar process undertaken in Canada in 2000 by Ratnayake and McDonald. As was the case in that review, we have found the association between saturated fatty acids and total and LDL cholesterol can unquestionably be described as 'convincing', with much evidence derived from randomised controlled trials and a clear dose response effect apparent with increasing amounts of saturated fatty acids. It should be noted that the extent of LDL cholesterol reduction achieved by lowering intake of saturated fatty acids is dependent upon the source of replacement energy. Replacing saturated fatty acids with polyunsaturated fatty acids would result in appreciably greater reductions in LDL cholesterol than replacement with either carbohydrate or monounsaturated fatty acids. Not replacing a reduction in saturated fatty acids, partially or totally, and resultant weight loss would also result in additional reduction of LDL cholesterol.

There is rather less direct evidence for the association between saturated fatty acids and CHD. While the studies generally suggest a relationship between saturated fatty acids and coronary heart disease and while there are certainly several plausible hypotheses, there are some inconsistencies in the data which cannot all be easily explained. Thus while we believe a reduction in saturated fatty acids is highly likely to reduce not only LDL cholesterol and other coronary heart disease risk factors but also cardiovascular disease, the current evidence for the direct association between saturated fatty acids and coronary heart disease is arguably more appropriately described as 'probable' rather than 'convincing'.

Far fewer data exist for *trans* fatty acids. However a series of well-conducted studies including randomised controlled trials show an association between *trans* fatty acids and LDL cholesterol. There are however two major limitations regarding the studies covered by the Canadian review and more recent data. Many of the studies do not distinguish between animal (largely occurring naturally) sources of *trans* fatty acids and vegetable sources, largely produced by the hydrogenation of vegetable derived oils. Furthermore it is not clear whether the effect of *trans* fatty acids on LDL cholesterol is biologically meaningful at low levels of intakes, such as that likely to be found in Australia and New Zealand. These limitations do not preclude the conclusion that the association between *trans* fatty acids and LDL cholesterol is a 'convincing' one.

Fewer data exist relating *trans* fatty acids directly to coronary heart disease than is the case for saturated fatty acids. However, there are also fewer inconsistencies than is the case with studies linking saturated fatty acids and coronary heart disease. While one case control study found a lack of association between *trans* fatty acids and sudden cardiac death, three recent case control studies are confirmatory of an association, and another suggestive of a trend towards a positive association. Despite the apparent strength of evidence some inconsistencies remain, and we therefore believe it may be more appropriate to describe the association between *trans* fatty acids and coronary heart disease as 'probable' rather than 'convincing'.

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Chapter 3: FSANZ Assessment of Circumstances under which the Relationships have been Substantiated

3.1 Calcium and Bone Health

3.1.1 Calcium, Vitamin D and Osteoporosis

FSANZ considers there is convincing evidence of a relationship between dietary intake of calcium, vitamin D status, and risk of the frail elderly, particularly women, developing osteoporosis (expressed either as bone mineral density or as fracture incidence).

- The relationship is associated with total calcium intakes in the range 1200 – 1700 mg/day and with additional vitamin D intakes in the range 17 – 20 µg cholecalciferol /day, among study participants with adequate or sub-optimal vitamin D status. These calcium intakes are well above median daily intakes among females and males aged 65 years and above as estimated in the 1995 Australian, and 1997 New Zealand, National Nutrition Surveys (620 and 730 mg in Australia, 640 and 750 mg in New Zealand).

- The beneficial effects of calcium have been demonstrated with a variety of forms of calcium.

- While there is a greater range of evidence for the effects of calcium and vitamin D among elderly women, the more limited data available for men is consistent with the findings in women.

- Energy needs are lower in the elderly compared to younger adults, particularly among those with reduced mobility. Foods targeted to the calcium requirements of the elderly should therefore contain relatively high concentrations of calcium to enable nutrient requirements to be met within the constraints of reduced energy intake.

- There appear to be relatively few foods widely consumed in Australia and New Zealand that are rich sources of vitamin D (for example contributing around 25% of nutrient reference values per serve) and addition of vitamin D to foods is currently limited. It is therefore not appropriate to recommend a minimum vitamin D content for foods that may carry a claim based on this relationship.

3.1.2 Calcium and Bone Mineral Density

FSANZ considers there is convincing evidence of a relationship between increased dietary intake of calcium and enhanced bone mineral density, particularly in women.

- Studies that support this relationship provided participants with additional calcium intakes of around 500 – 1000 mg/day, in addition to baseline intakes of around 500 – 1000 mg/day. Total calcium intakes in these studies ranged from around 1000 – 2000 mg/day. Median dietary calcium intake for Australians aged 19 years and over is estimated at 740 mg/day and 770 mg/day among New Zealanders aged 15 and above.

- While additional vitamin D was also provided in some, but not all, studies, there is convincing evidence that increased calcium alone has a positive effect on bone mineral density.

- The relationship is substantiated across a broad age range.

- While the majority of evidence supporting this relationship is derived from studies of females, the available evidence for males is consistent with the evidence for women.

- There is little evidence that a period of several years of dietary calcium intake substantially above current mean levels in children, will produce lasting skeletal benefits and sustained increases in calcium intake may be required for lasting benefit.

- The beneficial effects of calcium have been demonstrated with a variety of forms of calcium.

- Bone mineral density is predictive of the risk of developing clinical manifestations of osteoporosis such as some bone fractures or loss of height on ageing.

3.2 Sodium and Blood Pressure

FSANZ considers there is a convincing relationship between reduction in dietary intake of sodium and reduction in blood pressure.

- The relationship is associated with reductions in sodium intake in the order of 100 mmol/day, equivalent to 2300 mg sodium/day or approximately 5.8 g salt (sodium chloride) per day. This suggests that significant blood pressure reductions are achieved through a diet from which the majority of salt is removed.

- Studies available to support this relationship have involved adult participants of both sexes.

- While reductions in blood pressure are relatively modest at the individual level, they are significant in terms of the health of the overall population and are more marked among those with existing elevated blood pressure.

- A number of other lifestyle factors, such as body mass index, influence blood pressure but this appears to be independent of sodium intake.

- Increased potassium intake may also contribute to blood pressure reduction. While the beneficial effects of potassium on blood pressure appear to be greater when sodium intake is high, sodium restriction alone is associated with statistically significant reductions in blood pressure.

- Elevated blood pressure is a recognised risk factor for ischemic stroke.

3.3 Folates and Neural Tube Defects

FSANZ considers there is convincing evidence of a relationship between intake of folic acid in the periconceptional period and risk of development of neural tube defects in the foetus.

- The lowest dose of folic acid demonstrated to be effective in an intervention trial is 400 μg/day. However based on changes in red cell folate levels, doses as low as 100 – 200 μg/day consumed chronically may confer some protection.

- The strength of evidence indicating that naturally occurring folates are protective against neural tube defects is 'possible'. This conclusion reflects an absence of evidence (lack of intervention trials with natural folates and practical difficulties with the measurement, stability and bioavailability of natural folates), rather than the existence of evidence that indicates natural folates are not protective.

- Dietary Folate Equivalents is a means of expressing the amount of available folates in a food from both natural sources and from added folic acid and recognises the higher bioavailability of folic acid compared to naturally occurring folates (1 μg Dietary Folate Equivalents = 0.6 μg folic acid = 1 μg natural folates).

- Existing median daily folates intake among Australian and New Zealand women of childbearing age is estimated in the range at 195 - 217 μg and 194 – 213 μg respectively, substantially lower than the amount of folic acid demonstrated to be effective in reducing neural tube defects.

The recommended Upper Intake Limit for folic acid intake is 800 - 1000 μg/day. Folic acid is added to a range of foods available in both Australia and New Zealand (including some breakfast cereals, fruit juices and yeast spreads) and folic acid is also widely available in supplement form.

FSANZ is currently considering whether or not there should be mandatory fortification of foods with folic acid. If fortification with folic acid becomes more widespread, potential for high folic acid intakes may increase, particularly if associated with concurrent supplement usage.

3.3.1 Safety Considerations

An Upper Intake Limit is established for folic acid – 1000 μg/day for adults (800 μg/day for those aged 14 – 18 years).

Existing public health advice is that some foods should be avoided during pregnancy, either to minimise risk of exposure to *Listeria monocytogenes*, or to minimise exposure to mercury. Consideration should be given to restricting claims for folic acid and neural tube defects on foods that may be not recommended for consumption by pregnant women.

3.4 Saturated and *Trans* Unsaturated Fatty Acids and LDL-Cholesterol and Coronary Heart Disease

3.4.1 Saturated fatty acids

FSANZ considers there is a convincing relationship between reduction in dietary intake of saturated fatty acids (SFA) and reduction in blood levels of low density lipoprotein (LDL)-cholesterol.

However, the level of evidence for a relationship with coronary heart disease was assessed only as 'probable' and thus not of sufficient standard for pre- approval of a high level claim.

- Regression equations using data from metabolic studies suggest an approximate 0.05mmol/L increase in serum cholesterol for each 1% increase in total energy from SFA. In free-living situations, on average about half of this reduction in cholesterol is achieved for the same attempt at change in dietary SFA intake.

- Studies have typically tested this relationship with replacement of 5-10% total energy from SFA with an alternate energy source.

- Reduction of SFA intake is likely to have a greater LDL-lowering effect when replaced with n-6 polyunsaturated fats than with mono-unsaturated fats or with carbohydrate.

- Although the effects of different SFA are not equal, the various SFA co-exist in the food supply, and in aggregate the relationship to LDL-cholesterol is convincing.

- The beneficial effects of reduced SFA intake are observed in adults and children. However, it appears that SFA intake reduction in young children may only reduce LDL levels in boys and not girls.

- Weight loss can reduce total and LDL–cholesterol. Isocaloric studies clearly show that reductions in SFA intake reduce total and LDL-cholesterol also.

- There is no evidence that reducing total fat intake confers benefit on LDL-cholesterol levels beyond that resulting from the reduction in SFA.

- Potential undesirable effects associated with reduction in dietary intake of saturated fatty acids (e.g. impaired growth in children) have not been observed.

- The effect of saturated fatty acids on total cholesterol is almost entirely explained by changes in LDL-cholesterol. Therefore, it would be appropriate for companies to choose to use the terms 'LDL-cholesterol' or 'total cholesterol' or just 'blood cholesterol'. At the population level, total and LDL-cholesterol have the same meaning.

- Elevated LDL-cholesterol is a recognised risk factor for coronary heart disease.

3.4.2 Trans unsaturated fatty acids

FSANZ considers there is convincing evidence of a relationship between reduction in dietary intake of trans unsaturated fatty acids and reduction in blood levels of low density lipoprotein (LDL)-cholesterol. However, the level of evidence for a relationship with coronary heart disease was assessed only as 'probable' and thus not of sufficient standard for pre- approval of a high level claim.

- The relationship is associated with reductions in trans fatty acid where existing levels of trans fatty acid intakes are greater than 1% total energy.

- Trans fatty acids increase LDL-cholesterol levels and decrease HDL-cholesterol levels.
- Large quantities of trans fatty acids increase LDL-cholesterol to a greater extent than SFA.
- Predictive modelling equations estimate that replacement of trans fatty acids constituting 1% of total energy with carbohydrate would have the same effect on the total:HDL cholesterol ratio as replacement of 7.3% of SFA with carbohydrate.
- There is a clear dose response indicating an increase in LDL-cholesterol with increasing intakes of trans fatty acids, however studies demonstrating this relationship have used relatively high levels of trans fatty acids.
- It is conceivable that low levels of trans fatty acid intake (less than 1% total energy) may not influence LDL-cholesterol levels as do higher intakes, i.e. there may be a threshold effect.
- Studies available to support this relationship have involved men and women.
- There is an absence of data about the relationship between trans fatty acid consumption by children and the lipid profiles of children.
- The most favourable lipoprotein profiles overall are associated with diets low in saturated and trans unsaturated fatty acids and with relatively high proportions of cis-unsaturated fatty acids.
- Elevated LDL-cholesterol is a recognised risk factor for coronary heart disease
- It is not clear whether the effect of trans fatty acids on LDL cholesterol is biologically meaningful at low levels of intake likely to be found in Australia and New Zealand.

Chapter 4: Pre-approved List of Nutrient Function Statements

4.1 Introduction

FSANZ is proposing to include a pre-approved list of nutrient function statements in a guideline. This list will not be exhaustive, but will enable manufacturers to use claims based on the list, without a need for any further substantiation.

This attachment describes the rationale for following this approach and the derivation of the pre-approved list.

4.2 Pre-approved List of Nutrient Function Statements

At initial assessment FSANZ raised the possibility of developing a pre-approved list of statements to assist industry in making general level health claims and streamlining substantiation requirements. Under this arrangement FSANZ would be substantiating those statements included on the list. Manufacturers could base claims around these statements. However they would also need to ensure that the food meets any compositional requirements as determined by qualifying and disqualifying criteria.

4.3 Submitter Comments

All submitters agreed that FSANZ should develop some sort of list of general level health claims. Comments on the usefulness of such a list included that it would assist uniformity in interpretation and understanding, providing for more credible performance across industry. As the list is intended to provide meaningful examples and direction, some industry submitters raised the importance of 'road testing' the claims making it on the list.

Some submitters provided suggestions in terms of developing a list of general level claims to be included in a Guideline/interpretive userguide, including:

- claims classified as general level health claims that are already being used by manufacturers could be used as a starting point in building a pre-approved list, although these claims would need to be substantiated by scientific evidence; and
- several submitters suggested using the UK Joint Health Claims Initiative list of nutrient function statements as a starting point.

A number of submitters, mostly representing government, consumers and public health, felt that FSANZ should go one step further than a pre-approved list and actually pre-approve all general level health claims for inclusion in the Standard. This indicates that the 'list' would be exhaustive and that the general level health claims be in a Standard. Reasons provided by submitters in support of this included:

- The burden of substantiation is reduced for industry. This creates a more level playing field for all manufacturers because the larger and more well resourced food manufacturers that can dedicate resources to substantiating general level claims will not be able to gain a marketing advantage.

- Standardised wording of general level claims would provide consumers with consistent messages, which would assist consumer understanding and education.

- Industry and enforcement officers could refer to a consistent framework of substantiated general level claims to ensure compliance.

- Given that the pre-approval of high level claims could be long and onerous, manufacturers may choose to make a general level health claim instead of, or while they are waiting for the approval of a high level claim.

4.4 Proposed Approach at Draft Assessment

A pre-approved list of substantiated general level nutrient function statements has been developed by FSANZ. The list contains at least one example statement for nearly all recognised nutrients (see Appendix 2, Attachment 8). It is not an exhaustive list of all possible permitted general level nutrient function statements.

It is proposed that the list of nutrient function statements not be included in a Standard because the list is intended to be indicative and considered as a reference tool for industry. However, at this point in time, the date of the list is referenced in the Standard. It therefore would not preclude industry from making other general level health claims where these can be substantiated and where the claimed food meets qualifying and disqualifying criteria related to nutrient composition. Also the list can be more easily updated to include additional example claims as new evidence emerges which supports the link between a food component and a health effect. For the time being, the date of the standard however, would be subject to minor amendment in the Code.

It is important to note that the pre-approved indicative list will be a list of substantiated nutrient function statements, but not pre-approved wording of general level health claims. FSANZ may however use some of the substantiated nutrient function statements as the basis of example claims outlined in interpretive user guides underpinning the Standard. These examples will be included to facilitate understanding of the wording conditions of the Standard, providing guidance on how manufacturers can formulate fully compliant claims. In this respect, the nutrient function statements form the basis of the specific health effect related to the property of the food that is required to be communicated by health claims.

4.5 Derivation of Pre-approved Nutrient Function Statements

All statements presented in the list are appropriately substantiated, consistent with the guidance in the Policy Guideline and the principles set out in the FSANZ Substantiation Framework. Substantiation has been achieved through assessing the processes used by other food regulatory bodies, and carrying out an additional audit process to verify applicability to Australia/New Zealand.

4.6 The Joint Health Claims Initiative Substantiated Nutrient Function Statements

In developing the list, FSANZ considered the approach taken by the UK Joint Health Claims Initiative, which produced a list of several well-established (substantiated) nutrient-function statements for each of 28 vitamins and minerals, including trace elements. The substantiation requirements utilised by the Joint Health Claims Initiative compare closely with those of the FSANZ draft substantiation framework and therefore are appropriate as a basis for general level nutrient function statements.

4.6.1 Substantiation Requirements

The well-established nutrient function statements produced by the Joint Health Claims Initiative were substantiated through a process that essentially involved selecting and reviewing reports of scientific committees to assess the consistency in reporting about nutrients and their functions; a process that draws on secondary evidence sources (works that analyse and discuss original research), rather than primary sources (original research). The FSANZ draft Substantiation Framework for general level claims is also based on authoritative secondary sources. Only in instances where relevant secondary evidence is not available or is not up-to-date, are general level claims required to be substantiated using primary scientific sources.

The types of credible evidence utilised by the Joint Health Claims Initiative are compared with the types of authoritative evidence nominated under the FSANZ draft Substantiation Framework in the table below and assessed for equivalence.

The processes used by the Joint Health Claims Initiative and FSANZ differ in two areas. The first difference is their consideration of safety aspects related to the intake of nutrients. The reports drawn on during the Joint Health Claims Initiative process included safety assessments, such as a document considering the Safe Upper Levels for Vitamins and Minerals as produced by the UK Expert Group on Vitamins and Minerals. Within the FSANZ process, safety assessments are undertaken through processes separate to substantiation.

The second difference between the two processes is that they focus on different health policy environments and populations. The reputable expert groups and their reports utilised during the Joint Health Claims Initiative process are specifically focussed within the UK and Europe. This was done to ensure that resultant health statements are relevant to the UK and European environment and population. In a similar manner, the reports and policy documents nominated under the FSANZ framework are produced in the context of the Australian and New Zealand environment and population. However, the underlying scientific evidence for physiological roles and functions for the nutrients described by the statements will remain the same, hence these statements are considered substantiated scientific statements within the FSANZ framework.

In summary, though not identical, the substantiation requirements utilised by the Joint Health Claims Initiative compare closely with those of the FSANZ draft substantiation framework, such that these statements are suitable to be adopted as a basis for general level nutrient function statements.

Table 10.3: Comparison of the elements that comprise Joint Health Claims Initiative (JHCI) credible sources against authoritative sources proposed under the draft FSANZ Substantiation Framework

No.	JHCI	FSANZ
1.	**Credible source**	**Equivalent or related source**
	USA Institute of Medicine's publications on dietary reference values.	Information in the National Health and Medical Research Council Nutrient Reference Values publications (latest version due for release late 2005), and equivalent New Zealand government publications.
	Purpose	**Comment**
	Used as the starting point for drawing up a list of possible functions.	These documents are the Australian equivalent of the Institute of Medicine's documents, and were developed using the USA Institute of Medicine's work as a base.
2.	**Credible source**	**Equivalent or related source**
	Reports by reputable expert groups from the UK and Europe, including government, industry and non-government organisation groups.	Information in Australian National Dietary Guidelines and equivalent New Zealand documents, and other Australian and New Zealand diet-related policy documents, information in reviews conducted by appropriate authoritative scientific non-government organization groups, information in reviews conducted by authoritative, internationally recognised scientific bodies.
	Purpose	**Comment**
	To cross check and demonstrate consistency in the functions reported by the Institute of Medicine. To anglicise the statements for the UK population. Safety assessments included, for example - the Safe Upper Levels for Vitamins and Minerals produced by the UK Expert Group on Vitamins and Minerals.	Encompasses reviews produced by the National Health and Medical Research Council as part of the Australian Dietary Guidelines. These works could be considered the equivalent of the UK/European government reports. The FSANZ framework has been extended since the interim assessment report to include documents from non-government scientific authoritative bodies, and internationally recognised scientific authoritative bodies.
3.	**Credible source**	**Equivalent or related source**
	Textbooks – including an encyclopaedia of human nutrition, a handbook of nutrition and food and a textbook produced by the UK Nutrition Society.	Information in authoritative, current scientific texts of recent publication date and at a standard suitable for use in a university course in dietetics.
	Purpose	**Comment**
	To cross check and demonstrate consistency in the functions reported by the Institute of Medicine.	The three texts drawn on by the Joint Health Claims Initiative process are likely to meet FSANZ criteria (though whether they are specifically used in university dietetics course settings is unknown). The three texts were recent publications at the time of the Joint Health Claims Initiative work.
4.	**Credible source**	**Equivalent or related source**
	Reports of health claims assessed overseas were not included.	Information from reports of health claims assessed overseas.

No.	JHCI	FSANZ
	Purpose	**Comment**
		The assessment is required to have been conducted to the standard required for FSANZ high level claims.

4.7 Biological Role Claims Permitted by the Canadian Food Inspection Agency (CFIA)

The Joint Health Claims Initiative list of nutrient function statements is limited to 28 recognised vitamins and minerals. FSANZ also wanted to consider claims relating to nutrients beyond the scope of the Joint Health Claims Initiative work, such as macronutrients. Therefore the approach taken by the Canadian Food Inspection Agency, which encompassed claims around three macronutrients and omega-3 polyunsaturated fatty acids (see below), was considered.

Under the Canadian system, biological role claims are equivalent to function claims. The Canadian Food Inspection Agency has published a Guide to Food Labelling and Advertising (Canadian Food Inspection Agency - 2003 Guide to Food Labelling and Advertising - Chapter 8 - Diet-Related Health Claims - Sections 8.1-8.7), with section 8.5 providing guidance on biological role claims and presenting permitted biological role claims. Claims further to those presented in the Guide to Food and Labelling must be assessed by the Canadian Food Inspection Agency on a case-by-case basis prior to use.

4.8 Consideration of General Function Statements

Both the Joint Health Claims Initiative list of statements and the Canadian Food Inspection Agency list of biological role claims include a number of general statements that can be used for any nutrients. In the case of the Joint Health Claims Initiative, 5 substantiated statements are given that are common to all of the 28 vitamins and minerals considered:

'X contributes to normal reproduction'
'X contributes to normal conception'
'X contributes to normal development'
'X contributes to normal growth'
'X contributes to normal body maintenance'

The Canadian Food Inspection Agency provides 2 claims that are permissible for all nutrients, and including energy:

'Energy (or name of the nutrient) is a factor in the maintenance of good health'
'Energy (or name of the nutrient) is a factor in normal growth and development'

It is noted that the Australia and New Zealand Food Regulation Ministerial Council Policy Guideline on Nutrition, Health and Related Claims, claim pre-requisite number six states that:

'Claims must communicate a specific rather than a broad benefit.'

Therefore taking account of the Ministerial Policy Guideline, statements similar to those of the Joint Health Claims Initiative and the Canadian Food Inspection Agency on generic functions, such as normal body development, maintenance and growth, are not included in the pre-approved list.

4.9 Nutrients Considered Ineligible for Inclusion in the Pre-approved List

The Ministerial Policy Guideline indicates in Policy Principle number one that the new regulations should:

'Give priority to protecting and improving the health of the population'

Inclusion of claims relating to certain nutrients, such as those for which there is documented evidence of health risks from over-consumption, or advice against excessive consumption included in the Dietary Guidelines were therefore excluded from the list.

Relevant nutrients include fat, particularly saturated and trans fat and sodium. These nutrients are also the basis of criteria for disqualification of general level claims, hence it is not logical that statements that may promote their benefits be included in the pre-approved list. We will however allow low and reduced claims which refer to a reduction in these nutrients, as discussed in Attachment 8.

Vitamin A is not included because of the safety concerns in relation to consumption of high amounts of vitamin A in pregnancy.

Pre-approved statements for fluoride, chloride and potassium are also not included, as these minerals do not meet FSANZ's criteria in relation to nutrition content claims. Content claims for these minerals are not currently permitted as RDIs for the minerals are not included in Standard 1.1.1. RDIs for some of these minerals may be produced when the Australian and New Zealand nutrient reference values are updated, a process expected to be finalised in the near future.

4.10 Macronutrients

A statement based on the Canadian Food Inspection Agency claims relating to protein has been drawn upon as the basis for macronutrient function statement within the FSANZ pre-approved claims list.

4.11 Claims relating to other nutrients

4.11.1 Omega-3 polyunsaturated fatty acids

A statement around omega-3 polyunsaturated fatty acids was considered appropriate to include in the FSANZ list since the Dietary Guidelines for Australian Adults include the recommendation that it would be desirable to double intakes of these fatty acids. The Canadian Food Inspection Agency guide includes a biological role claim for the long chain omega-3 polyunsaturated fatty acid: docosahexaenoic acid. However the FSANZ minimum qualifying criteria for claims about omega-3 fatty acid content permits an option for foods to source the requisite omega-3 fatty acids entirely from alpha-linolenic acid, a shorter chain omega-3 fatty acid. Therefore, to align the qualifying criteria with the subject of the claim, only criteria that refer to docosahexaenoic acid are considered appropriate.

4.11.2 Dietary fibre

In addition to claims for macronutrients, vitamins and minerals, and omega-3 polyunsaturated fatty acids, FSANZ has considered inclusion of additional statements for nutrients not represented in either the Joint Health Claims Initiative or Canadian Food Inspection Agency lists. One such nutrient is dietary fibre. The Dietary Guidelines for Australian Adults recognise that diets rich in insoluble dietary fibre, such as that present in wholegrain cereals and breads, are associated with a low prevalence of constipation and diverticular disease. This benefit is encompassed within the guideline 'Eat plenty of cereals (including breads, rice, pasta and noodles), preferably wholegrain', where the words 'eat plenty' are designed to encourage people to choose these foods liberally as the basis of their diet.

'Dietary fibre' is defined in Standard 1.2.8 of the Code as the fraction of the edible part of plants or their extracts or synthetic analogues that:

- are resistant to digestion and absorption in the small intestine, usually with complete or partial fermentation in the large intestine; and
- promote one or following beneficial physiological effects:

    a. laxation;
    b. reduction in blood cholesterol;
    c. modulation of blood glucose.

While the latter two physiological roles (b and c) might be appropriately considered under high level claims if substantiated, a general level nutrient function statement consistent with the first role (laxation) is appropriate and has been included in the pre-approved list.

4.12 Additional/advisory notes for statements

The Joint Health Claims Initiative list of statements provides additional notes for six specific nutrients – vitamin A, vitamin D, niacin, sodium, potassium and fluoride. As indicated above, statements for vitamin A, potassium and fluoride are not to be included in FSANZ's pre-approved list. FSANZ has given consideration to each of the notes for other nutrients, Vitamin D, niacin and sodium, to determine whether it is appropriate to include these notes as required elements within a related claim.

- For vitamin D, note is made that *sufficient vitamin D can be synthesised in the body with adequate exposure to sunlight.* This note provides additional but not necessary information in relation to function statements for vitamin D. Furthermore, inclusion of a statement to this effect may also conflict with Australian public health advice around avoiding excess exposure to sunlight. Therefore a note in relation to exposure to sunlight will not be required.

- For niacin, note is made that *sufficient niacin can be synthesised in the body with adequate dietary intake of protein or tryptophan.* This note provides additional but not necessary information in relation to function statements for niacin.

- For sodium, note is made that *it is essential that consumers continue to be encouraged to reduce sodium intake.* As discussed above, it is recommended that claims for sodium not be included in the pre-approved claims list, therefore this note does not require further consideration.

APPENDIX 1

Pre-approved Nutrient Function Statements for Recognised Nutrients

Table 1: Pre-approved statements for recognised vitamins and minerals

Pre-approved statements for vitamins and minerals are based on the UK Joint Health Claims Initiative (JHCI) list of well-established statements.

Nutrient	*Model statement from JHCI*
Vitamin D	Vitamin D is necessary for the normal absorption and utilisation of calcium and phosphorus
Vitamin E	Vitamin E is necessary for cell protection from the damage caused by free radicals (such as oxidation of polyunsaturated fatty acids in red blood cell membranes)
Vitamin K	Vitamin K is necessary for normal coagulation (blood clotting)
Thiamin	Thiamine is necessary for the normal metabolism of carbohydrates
Riboflavin	Riboflavin contributes to the normal release of energy from food
Niacin	Niacin is necessary for the normal release of energy from food
Pantothenic acid	Pantothenic acid is necessary for the normal metabolism of fat
Vitamin B_6	Vitamin B_6 is necessary for the normal metabolism of protein
Folate	Folate is necessary for normal blood formation
Vitamin B_{12}	Vitamin B_{12} contributes to normal blood formation
Biotin	Biotin contributes to normal fat metabolism and energy production
Vitamin C	Vitamin C is necessary for normal structure and function of connective tissue (such as that required for normal gums, skin, healing processes, bone and cartilage)
Calcium	Calcium is necessary for normal structure of bones and teeth
Magnesium	Magnesium is necessary for normal energy metabolism
Iron	Iron contributes to normal blood formation
Copper	Copper is necessary for the normal function of the immune system
Iodine	Iodine is necessary for normal production of thyroid hormones
Zinc	Zinc contributes to the normal structure of skin and normal wound healing
Manganese	Manganese contributes to normal bone function
Phosphorus	Phosphorus is necessary for the normal structure of bone and teeth
Selenium	Selenium is necessary for cell protection from some types of damage caused by free radical damage

Table 2: Pre-approved statements for nutrients other than vitamins and minerals

Claims for protein and omega-3 polyunsaturated fatty acids are derived from the Canadian Food Inspection Agency (CFIA) system. The dietary fibre statement is based on background information in the Dietary Guidelines.

Nutrient	**CFIA claim**	**Other claim (derived from the Australian Dietary Guidelines)**
Protein	*'helps build and repair body tissues'*	
Docosahexaenoic acid (DHA)	*'DHA, an omega-3 fatty acid, supports the normal development of the brain, eyes and nerves'*	
Dietary fibre		*'contributes to regular laxation'*