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## Scientific Interpretive Summary

### Vitamin D – Literature Review

Vitamin D is an essential nutrient that can be synthesised in the body through exposure to sunlight or obtained through eating foods that are naturally good sources of Vitamin D<sup>1</sup>. A deficiency of vitamin D can lead to rickets in children and osteomalacia (poor bone mineralisation) and osteoporosis (bone loss) in adults<sup>2</sup>. Research suggests that vitamin D may also play a role in the prevention of certain cancers<sup>3</sup>.

Definitions of vitamin D deficiency and insufficiency have not yet been agreed upon within the scientific community. In an analysis of the data from the New Zealand 1996/97 National Adults Nutrition Survey and 2002 Children's Nutrition Survey, cut-offs were defined to estimate vitamin D deficiency and insufficiency in the population. These were <17.5 nanomoles per litre and <37.5 nanomoles per litre respectively<sup>4 5</sup>.

Using these cut-offs, data from the 1996/97 National Adults Nutrition Survey indicated that 28% of New Zealanders (15 years or older) had vitamin D insufficiency and 3% were deficient<sup>6</sup>. According to the 2002 Childrens' Nutrition Survey, 31% of 5-14 year olds were vitamin D insufficient and 4% deficient<sup>7</sup>.

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1 Mann J and Truswell AS. Essentials of Human Nutrition. Second edition. Oxford University Press. 2002.

2 Australian Government and the New Zealand Ministry of Health. Nutrient Reference Values for Australia and New Zealand. 2005.

3 Scragg R. Vitamin D, Sun exposure and Cancer: A review prepared for the Cancer Society of New Zealand. 2007.

4 Green T, Skeaff M, Rockell J. Serum 25-hydroxyvitamin D status of New Zealand adolescents and adults 15 years or older: Results of the 1997 National Nutrition Survey. 2004.

5 Rockell JE, Green TJ, Skeaff CM et al. Season and ethnicity are determinants of serum 25-hydroxyvitamin D concentrations in New Zealand children aged 5-14 y. Journal of Nutrition. 135: 2602-2608. 2005.

6 Green T, Skeaff M, Rockell J. Serum 25-hydroxyvitamin D status of New Zealand adolescents and adults 15 years or older: Results of the 1997 National Nutrition Survey. 2004.

7 Rockell JE, Green TJ, Skeaff CM et al. Season and ethnicity are determinants of serum 25-hydroxyvitamin D concentrations in New Zealand children aged 5-14 y. Journal of Nutrition. 135: 2602-2608. 2005.

The emerging research on the role of vitamin D and health and population data indicating the prevalence of vitamin D deficiency prompted the New Zealand Food Safety Authority (NZFSA) and the Ministry of Health to commission a review of the scientific literature on vitamin D. In 2006, the Department of Human Nutrition at the University of Otago conducted the review with the aim of clarifying the role of vitamin D in the body; the health implications of vitamin D deficiency; the level of vitamin D required to achieve optimum health status and current international strategies to improve vitamin D status.

Key points from the literature review include:

- Vitamin D plays an important role in bone health.
- Rickets and osteomalacia are the most well known consequences of vitamin D deficiency.
- There is emerging evidence that vitamin D may reduce risk of certain types of cancers, however at this point in time there is insufficient evidence to confirm this.
- Of the types of cancers reviewed, the strongest evidence for a protective effect of vitamin D is for colorectal cancer.
- Until more convincing scientific evidence is available, public health policy with regards to vitamin D is best directed by its comparatively clear role in skeletal health.
- Serum 25-hydroxyvitamin D concentration is the best indicator of vitamin D status as it reflects both synthesis in the skin and that which is absorbed from the diet.
- A universal criterion to define the minimum concentration of 25-hydroxyvitamin D associated with maximum risk reduction has not been established.
- There is no consensus on an optimal vitamin D concentration (as serum 25-hydroxyvitamin D) for bone health in adults, however it is likely to be more than 50 nanomoles per litre for the general population. This may be higher for older age groups (e.g. 80 nanomoles per litre).
- The prevalence of low vitamin D status is high in elderly populations in New Zealand.
- For those who are at high risk of not getting enough vitamin D, supplements are needed to ensure adequate vitamin D status to prevent poor bone health.
- The Australia New Zealand Food Standards Code currently allows the voluntarily addition of vitamin D to foods such as milk, milk products and edible oil spreads<sup>8</sup>. In Australia, table edible oil spreads and table margarine must contain no less than 55 micrograms of vitamin D per kilogram of food. New Zealand has no such mandatory requirements.
- In Canada, the addition of vitamin D to milk, margarine and certain vegetarian foods is mandated. Since breastmilk is a poor source of vitamin D, a daily vitamin D supplement of 10 micrograms is recommended for healthy breastfed fullterm infants. Adults over the age of 50 years are recommended to take a 10 microgram supplement daily because of the difficulty of obtaining sufficient levels through dietary and sun exposure.
- The United Kingdom mandates fortification of margarine with vitamin D to match the content in butter. A daily vitamin D supplement of 10 micrograms is recommended for pregnancy and breastfeeding women and for older people who cannot obtain sufficient levels through dietary and sun exposure.
- The United States permit the addition of vitamin D to a wide range of foods. The American Association of Paediatrics recommends a daily supplement of 5 micrograms for breastfed infants beginning within the first two months of life unless they are weaned to receive at least 500 millilitres per day of vitamin D-fortified formula.

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<sup>8</sup> Australia New Zealand Food Standards Code. Standard 1.3.2 Vitamins and Minerals. Cited at

[http://www.foodstandards.gov.au/the\\_code/foodstandardscode/index.cfm](http://www.foodstandards.gov.au/the_code/foodstandardscode/index.cfm)

The findings of this review will be used by NZFSA Risk Managers in considering practical options to manage any risk from deficiency or excess of vitamin D in the New Zealand population.

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