

Comments on Draft report of the WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases

Submitted by

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4. The Food Directorate is the organisational section within Health Canada charged with carrying out the mission of the Food Program.
5. Recognizing that food is fundamental to health, the mission of the Food Program is to protect and improve the health of the people of Canada through science-based policies and programs related to safe and nutritious food.
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General Comments:

1) Given the world- wide recognition and potential application of the proposed recommendations in developing a global strategy on diet, physical activity and health for the prevention and control of noncommunicable disease, the **level of evidence** to support the recommendations should be such that the recommendations are not likely to be reversed by new knowledge. We recommend that an explicit systematic approach be taken such that the totality of evidence is considered, and clear criteria for convincing evidence, including study quality criteria should be stated and consistently applied. Although in most Annexes, the literature reviews are comprehensive, in one Annex (dietary factors and cardiovascular disease risk), the literature review is limited and selective. The weakness results in several recommendations which are not supported by data and/or analysis in the cardiovascular disease section.

2) The lack of research on dietary factors on populations with **genetic and dietary backgrounds** different from those in North American and European populations may merit caution and present some limitations in extrapolating recommendations based on research largely from North American and European populations to those in Asian and African populations. In some cases such differences have been considered, eg for osteoporosis. In other cases, for example, with regard to folate and homocysteinemia, a generalization about global risk may not be appropriate: about 12% of Caucasians and Asians are homozygous for a gene for low activity of 5, 10-methylene tetrahydrofolate reductase (MTHFR) and about 50% are heterozygous (van der Put et al, 1996; Bailey and Gregory, 1999), whereas only about 1% of African Americans are homozygous. Although MTHFR activity is reduced in both homozygous and heterozygous individuals, elevated homocysteine levels in this group are seen only in the homozygous state at low plasma folate levels, leading to the suggestion that this segment of the population may have an increased requirement for folate (van de Put et al, 1997b). A global recommendation for increased folate to reduce the risk of CVD may be inappropriate for populations where this mutation is not common, and where B12 deficiency is common. In addition, as noted later, there

is insufficient evidence that homocysteinemia is a risk factor for CVD. With regard to sodium, certain populations have very high sodium intakes but no elevations in blood pressure with age (Kawasaki et al, 1993).

3) Some of the recommendations made in the report are **in agreement with Health Canada** Nutrition Recommendations, 1990 as well as the major findings in the recent literature reviews conducted by Health Canada in relation to the currently proposed regulations on Nutrition Labelling, Nutrient Content Claims and Health Claims. The Health Canada reviews focussing on health claims approved in the U.S. support the WHO FAO recommendations related to cardiovascular disease (CVD) for saturated and *trans* fatty acids (Ratnayake, 2000), for foods rich in potassium, and foods low in sodium (Johnston, 2000), and for fruit, vegetables, whole grains and brans (Cvitcovic et al, 2002). However, for sodium, the target is a moderate sodium intake (<4 g sodium/d). For cancer risk, the Health Canada reviews focussing on cancer are consistent with the WHO FAO recommendation pertaining to fruits and vegetables (Brooks, 2000), and also the null relationship with fats and dietary fibre/whole grains (Brooks, 2001). The WHO FAO recommendation of 400-500 g fruit and vegetables approximates 4 servings, which is lower than the 5-10 servings/d recommended in Canada's Food Guide to Healthy Eating.

The Health Canada reviews are **not in agreement** with the WHO FAO recommendation related to CVD risk and the restriction in sodium to <1.7 g sodium for the general population. The level of evidence for folate is insufficient rather than probable. Details are presented below.

3) The **population target groups** for the proposed recommendations are suggested to be young adults, at least for cardiovascular disease to "shorten the phase of escalating incidence of cardiovascular disease in mid- life and rapidly transit to the phase of delayed and stable cardiovascular disease burdens" (Annex 4, p 5). The target groups for the proposed recommendations should be made more explicit to avoid risks to children and pregnant and lactating women (such as those due to energy restriction; restriction of meats and dairy products and eggs [foods containing cholesterol]; sodium restriction; low energy density associated with high intake of dietary fibre).

Specific Comments:

Dietary Fats and CVD

1. Plant sterols and stanols:

The text mentions nothing about plant sterols and stanols, but surprisingly in Table 6 (page 31) plant sterols/stanols have been identified as probable factors that may decrease the risk of developing cardiovascular diseases. Scientific evidence for this action should be presented in the text. This recommendation by FAO/WHO is contradictory to the statement made in Section 6.5 of the document (page 60) which suggest that promotion of cardiovascular health should be achieved from a combination of natural foods rather than seek it through specific supplements.

2.) Recommended Intake of Polyunsaturated Fatty Acids

A rationale should be presented for the recommended n-6 PUFA and n-3 PUFA at 5-8% and 1-2% levels of daily energy intake, respectively (Section 8.2, page 68).

3.) Recommended Intake of monounsaturated fatty acids

The text should clearly identify the monounsaturated fatty acid as oleic acid (Section 8.2, page 68). This is because other monounsaturated fatty acids have nutritional and biological effects different to those of oleic acid. For instance, erucic acid is known to cause heart lesions in animal models, trans-monounsaturated fatty acids are hypercholesterolemic. In addition, nothing is known about the effects of other monounsaturated fatty acids (e.g., cis-vaccenic acid, palmitoleic acid).

Dietary Sodium and CVD

1.) The recommendation to limit sodium intakes of populations to 1.7 g sodium/d to reduce the risk of CVD may well put segments of the populations at risk of more immediately serious conditions, and have minimal or no impact on preventing cardiovascular disease.

The WHO FAO review of the literature on this topic is incomplete. The review (p 39) cites only the early systematic review of controlled trials by Law et al, 1991 in estimating the impact of salt restriction on blood pressure. Law et al estimated an unusually high effect of sodium restriction, due to the inclusion of non-randomised trials, an effect not observed in the subsequent five meta analyses (Cutler et al, 1991; Swales, 1995; Midgley et al, 1996; Cutler et al, 1997 and Graudal et al, 1998). These subsequent meta analysis have consistently indicated that the effect of salt restriction in normotensive populations is a small but usually significant reduction in blood pressure of about 1 mm Hg systolic pressure. The effect on diastolic pressure has been usually <1mm Hg, and often not statistically significant. This effect is summarized below from 6 meta analyses of trials of salt restriction in normotensive individuals.

	Reduction in BP (mm Hg)	Reduction in Na (mmol/d)	Number of trials	Randomized only
Law et al, 1991	10 ^a /5 ^a	100	23	no
Cutler et al, 1991	1.7*/0.97*	76	6	yes
Swales, 1995	1.48 ^a /0.94 ^a	100	9	yes
Midgley et al, 1996	1.0*/0.1	100	28	yes
Cutler et al, 1997	1.9*/1.1*	76	12	yes
Graudal et al, 1998	1.2*/0.26	160	56	yes

* statistically significant; ^a significance level not reported

Furthermore, the effect of other dietary changes on blood pressure are much larger than those seen with sodium restriction. The DASH trials found physiologically and significant falls in blood pressure (5.5 mm Hg systolic /3.0 mm Hg diastolic) in a high risk group with a dietary intervention involving a diet rich in fruits, vegetables and low fat dairy products, but no restriction in sodium (Appel et al, 1997). When a sodium restriction was added to the DASH diet, (from 150 mmol/d reflecting typical consumption in the U. S.[about 3.5 g sodium or 8.5 g sodium chloride]), to 100 mmol/d, or 50 mmol/d the further effect on systolic blood pressure was small (1.3 mm Hg, and 1.7 mm Hg respectively). The effect on diastolic pressure was even smaller (0.6 mm Hg, and 1.0 mm Hg respectively) (Sacks et al, 2001).

At current levels of sodium intake in the US, urinary sodium excretion (a surrogate of dietary sodium intake) did not predict the development of hypertension in a large 7-year prospective study of normotensive adults (Hunt et al, 1991), whereas age, baseline blood pressure and indicators of obesity had the strongest associations with increased risk of future hypertension. In Nepal, where sodium intakes are very high, no elevations in blood pressure were seen with increasing age (Kawasaki et al, 1993). In Finland, hazards ratios for coronary heart disease frequency and cardiovascular and all-cause mortality were not associated with 24 hour sodium excretion in normal weight men nor in all women, although these indicators were significantly associated with sodium excretion in overweight men (Tuomilehto et al, 2001).

Adverse Effects of Sodium Restriction

Four reports including one meta analysis suggest that lowering sodium intakes by the general and hypertensive population is associated with increased CVD risk. Only one of these reports is discussed in the Consultation (Annex 4, p 12). Reported risks include increased mortality (Alderman et al, 1995, Alderman et al, 1998, Tunstall-Pedoe, 1997) and increased plasma renin and aldosterone, noradrenaline, cholesterol and LDL cholesterol (Graudal et al 1998; Alderman et al, 1991). In addition, fatigue and impaired sexual function were more frequently reported on a low sodium diet than on either normal diet or weight reduction in hypertensive men (Wassertheil-Smoller et al, 1991).

Alderman et al, 1995 first reported a 4-fold greater likelihood of myocardial infarction associated with low sodium intake (24 h excretion) in a cohort study of 2937 men and women with mild or moderate hypertension. In men, but not women, the incidence of myocardial infarction was 4 times higher with the lowest quartile of daily sodium excretion (less than 89 mmol/d) compared to those with highest sodium excretion (more than 175mmol/d) during a 3.8 year follow-up. This study has been criticized because urine was collected after 4 or 5 days during which subjects had been advised to avoid foods excessively high in salt (de Wardener and MacGregor, 1998). Thus the urine sodium value would not necessarily reflect usual sodium intake. Alderman et al, 1998a also examined the mortality rates in 11,346 individuals in a prospective cohort study from the NHANES I survey followed over 8-11 years. For these individuals sodium intake was estimated from a single 24 h recall that did not include salt added during cooking or at meals. All-cause mortality and cardiovascular mortality were inversely associated with sex-specific quartiles of sodium intake, as well as total caloric intake. These findings persisted even after excluding individuals with known cardiovascular disease and hypertension at initial examination. The findings also held when participants with reported intakes of less than 1000 Kcal were excluded (Alderman et al, 1998b). This study has been criticized for the unreliable assessment of sodium intake. In a similar analysis of the same data set, this finding did not hold when the individuals were classified on the basis of overweight or non-overweight. He et al, 1999 found that among overweight individuals (BMI 27.8 or over), a 100 mmol higher sodium intake was positively associated with 39% increase in all-cause mortality, 61% increase in cardiovascular disease mortality, 32% increased risk of stroke incidence, 89% increase in stroke mortality. In non-overweight persons, dietary sodium was not associated with cardiovascular disease or mortality.

A significant inverse relationship between sodium intake (urine sodium) and all cause mortality in men, was also shown in the Scottish heart health study (Tunstall-Pedoe et al, 1997). In this prospective cohort study 11,629 men and women aged 40-59 were followed for an average of 7.6

years to compare prediction of 27 different factors for coronary heart disease events, coronary deaths and deaths from all causes. Sodium excretion was not related to coronary heart disease in men, but was just positively related to coronary heart disease in women. Urine potassium surprisingly was strongly inversely related to all deaths for both men and women.

While these data indicating an increased risk of all cause mortality with low sodium intakes are not compelling evidence that low sodium diets are unsafe, they also do not demonstrate any benefit in terms of reduced myocardial infarction or improved cardiovascular outcomes.

The growing prevalence of obesity has been attributed to the combined effects of poor dietary habits and low levels of physical activity. Interventions aimed at combating this problem include increased physical activity. It is well known to exercise physiologists that high levels of sodium intake are required for individuals undergoing strenuous exercise to replace losses from sweating. Rivera-Brown et al, 1999 found that sweat loss in boys exercising in the heat was over 1,500 g sweat in 3 hours. Sodium excretion in sweat has been estimated at between 0.3 and 2.7 g/L (Consolazio et al 1963). At the upper level of sodium loss in sweat it can be calculated that 3 g sodium could be lost in sweat in this exercise bout. If not replenished, virtually all filtered sodium will be reabsorbed by the kidney and potassium will excreted in its place leading to marked potassium depletion. Since vigorous exercise will result in dramatic reductions in the blood concentration of potassium which will be magnified in the presence of significant potassium depletion, there is the real danger of provoking a serious cardiac arrhythmia and possibly sudden death in this setting. This concern challenges the current proposal of reducing dietary sodium intake to the low levels of 1.7 g/d for populations some large segments of which engage in high levels of physical activity in hot temperatures on a daily basis. The WHO FAO commentary on this issue, Annex 4, p 41, is that “less than 5 g salt per day.. would be appropriate even in tropical climates, as sodium homeostasis regulates sodium excretion in sweat and urine without adverse effects under such conditions.” Until data are presented on the metabolic handling of sodium and potassium under conditions of tropical heat and regular/high physical activity, the recommendation for sodium restriction to this level is premature.

Other health risks associated with low sodium intakes include inadequate intake of iodine (Hollowell et al, 1998), increased insulin resistance (Feldman and Schmidt, 1999; Ruppert et al; Lind et al, 1992), and impaired baroreflex function (Grassi et al, 1997).

Folate and CVD

Annex 4 comments that it is unclear whether homocysteinemia is an independent risk factor of CVD, and concludes that recommendations related to folate supplementation and CVD risk must await the results of ongoing clinical trials. Yet folate in the summary of evidence is reported as “probable” evidence for decrease in risk of CVD. This conclusion is not supported by the evidence presented. (By contrast, a meta analysis of 42 trials on dietary and non-dietary calcium supplementation (Griffith et al, 1999) demonstrating an effect of about the same magnitude as the meta analyses of sodium restriction leads to a conclusion of “insufficient evidence” for a relation between calcium and CVD, Annex 4 p 67).

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